Escola Politècnica Superior d'Edificació de Barcelona
UNIVERSITAT POLITÈCNICA DE CATALUNYA

REHABILITATION PROJECT OF THE EPSEB FACULTY BUILDING

Bachelor thesis project

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Abstract

The Escola Politècnica Superior d'Edificació de Barcelona (EPSEB) faculty building belongs to the South Campus of the Universitat Politècnica de Catalunya (UPC). The building is situated in the district of Les Corts, along the Av. Doctor Marañon, in the city of Barcelona.

The EPSEB faculty building was built in 1961 and extended, little by little through the years, reaching its current extension in 1985. Today the building hosts various bachelor's and master's degree courses, but it shows a lack of common spaces for students, of university facilities besides humidity and energy problems.

The aim of the project is to refurbish the building, in order to get its energy performance as close as possible to the Net-Zero Energy Building (NZEB) European standards and to redesign the current layout of inside spaces, encouraging a better use of common areas and higher quality university facilities.

The work of the project is organized in three different phases. The first phase is a preliminary historical research which describes the urban evolution of Les Corts district and illustrates the changing of the EPSEB building through the years.
The second phase consists of an architectural survey followed by an analysis of existing energy data linked with the effective use of the building.
The last phase is a project proposal illustrating the necessary interventions to achieve a higher quality building in terms of both energy efficiency and architectural composition.

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1 INTRODUCTION

The building object of the study is the current official head office of the Escola Politècnica Superior d'Edifiació de Barcelona (EPSEB), one of the faculties belonging to the Universitat Politècnica de Catalunya (UPC). Catching the drift of a university campus project idea, the building was realized in Barcelona in 1961 in a western area of the city called Zona Universitaria.

The building is made up of three blocks belonging to three different historical periods. The main unit is organized on 6 floors: basement, ground floor and 4 upper floors. Today, a lack of common areas and an inadequate functional organization of the available spaces prevent users to enjoy university facilities. Moreover, the building envelope does not guarantee the optimal comfort conditions for inside environments.

As an Erasmus+ student I came to the EPSEB faculty to deepen my knowledge about energy efficiency and sustainable materials, but still, my academic background in Building Engineering-Architecture, taught to me to choose the best technological intervention to apply to structures, also taking into consideration their architectural and cultural value. For this reason, the project is introduced by a preliminary research on the historical evolution of the site context and of the building, both developed by carrying out an archive and bibliographic research.

The second step consists of an architectural survey made on site with the purpose to compare the information provided by the original projects of the building with its actual current state. Follows the architectural graphic representation and details of the constructive systems. Moreover, a functional analysis of the spaces, together with a study of the actual number of enrolled students; administrative employees and a statistic forecast of expected future students are also part of the necessary analysis to design a new functional plan layout and optimize energy consumption.

For what concerns the energy analysis, previous thesis works have already drawn up the energy certification of the building establishing its total energy demand. The energy intervention on coverings and coating will be based on these existing data and will approach the building behaviour to the NZEB standards. Since these European standards have become mandatory for all new buildings with a public destination of use, this refurbishment is a useful example of sustainable architecture.

The new plan layout and some of the first energy project solutions will be started at the EPSEB and subsequently completed in La Sapienza University of Rome.

2 PRELIMINARY HISTORICAL STUDY

2.1 HISTORICAL AND URBAN EVOLUTION OF LES CORTS

2.1.1 Introduction

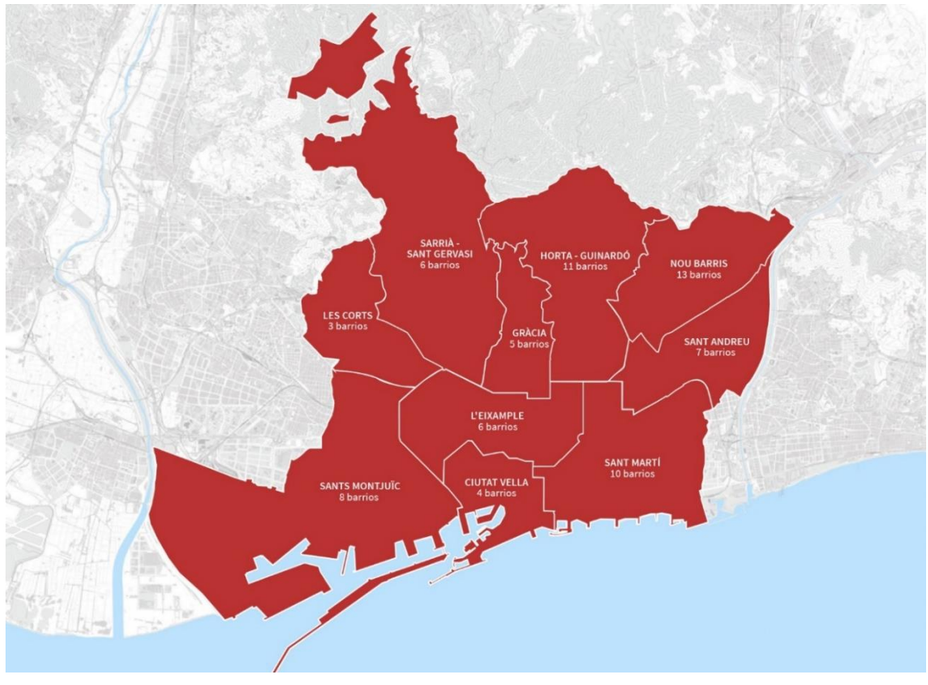
The EPSEB building is situated in the North-West side of Barcelona in the 4th of the 10 districts in which the city is organized since 1984. The district of *Les Corts* is one among the last ones included in the city territory: it borders with three other districts on the East side (*Sarrià-Sant Gervasi, Eixample, Sants-Montjuïc*) and two municipalities on the western outsider part (*L'Hospitalet de Llobregat and Esplugues de Llobregat*).

The district of Les Corts was born in 1836 out of the two elder municipalities of *Les Corts de Sarrià* and *Sarrià*, but only in 1897 the district became part of the city of Barcelona. Its name comes from the Latin word *cohortes* (in English 'rural houses'), referring to the Roman villas appeared in the valley during the Roman domination. The villas were situated just outside the city of *Barcino* as a proof of the existence of an agricolture activity closely connected to the city. Some archaeological evidence of these villas have been found near the areas of the monastery of Pedralbes and, also, the finding of a Roman necropolis, along the present road called *Travessera,* witnesses the presence of ancient rural settlements in the territory.

During the Middle Ages many farmhouses were built in this area, probably to take advantage of the high fertility soil. This was mostly irrigated by the *Riera Magòria* and *Riera Blanca* rivers that sloped down from the Collserola mountains to reach the sea. The rural marked feature of *Les Corts* always characterized the district until its urbanistic growth that only took place in the 20th century.

The ancient central heart of *Les Corts* was included in between *Riera Magòria* and *Riera Blanca* rivers and was organized along two main axes, the *Travessera* and the *camí Real* ('royal road'). The second road had its starting point in the centre of Barcelona, it left the city through the portal of *Tallers* and finally crossed the *Travessera* at the height of *Can Bruixa* (the actual Carrer del Marquès de Sentmenat). The royal roads were under the king's protection; this meant they were roads of public use and that the feudal lords could not charge travellers with passage fees.
The western part of the district, situated between la *Riera Blanca* and *Torre Melina,* corresponded instead to the current area of the Zona Universitaria.

During the Middle Ages the territory of *Les Corts* was directly under the jurisdiction of Barcelona's ear. Later, it became an autonomous village linked to the church of *Sant Vicenç de Sarrià*, with the exception of the *Torre Melina* which, instead, belonged to the church of *Santa Eullàlia Provençana*. At that time the inhabitants of *Les Corts* had proper representatives among the administrastors of *Sarrià* and this form of government remained the same untill the 19th century, when *Les Corts* became an indipendent district.



2.1 Map of the districts of Barcelona (Ajuntament de Barcelona)

2.2 Distribution of the ancient farmhouses in Les Corts according to Les Corts plan of 1870-80. (AMDC, Pere Poll)

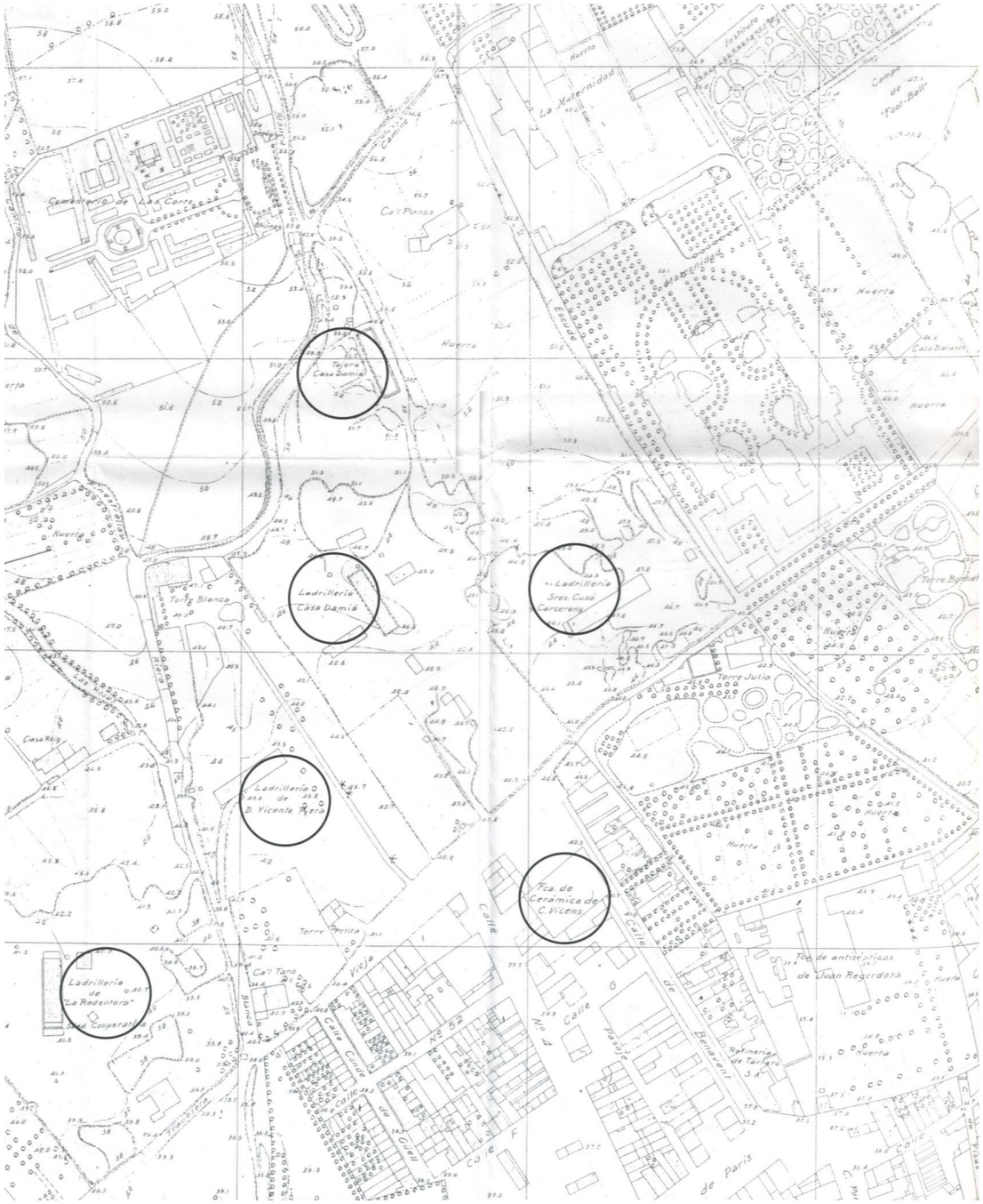
2.1.2 The XIX century

1830s - When in 1836 *Les Corts* became an independent district from *Sarrià,* the area that today is known as *Corts Velles*, extending between *Carrer d'Europa, Calle de Galileu*, *Travessera de Les Corts* and *Gran vía de Carles III*, it was mainly a group of farmhouses. The most important of them were arranged along a torrent that changed name through the years (torrent of Matacans, Quatre Camins, torrent of Morts). This torrent runned parallel to the road known today as *Carrer de Les Corts*, where, at that time, it was possible to find the following rural houses: *Can Grau, Can Coix, Can Galopa* and *Can Sol de Dalt*. These farmhouses kept being active until the beginning of the 20th century.

1840s - With the arrival of independence the district of *Les Corts* went through a period of urban expansion and evolution which led to the starting of the rural landscape transformation. In 1845 a new part of the district, called by the name of *Corts Noves*, began to take shape with its centre situated in *Plaça de la Concórdia*. A new route was realized to connect the areas of *Corts Velles* and *Corts Noves* and, in 1849, the church of *Santa Maria del Remei* was built: it was *Les Corts* first proper church. Not far from it, where the football stadium is today situated, a cemetery sprang out. It was later demolished and rebuilt afresh in 1897.

1850s/60s - After the urbanization of *Corts Noves* the district went through a new phase of important transformations, mostly due to the rising of new factories in the area. Before 1845 some factories had already settled the territory, but with the increasing demand of building materials, which were necessary to face the construction of the *Eixample*, the territory of *Les Corts* began to welcome most of the new factories. The great extension of lands and richness of clay and water, coming from the Collserola mountains, made it the perfect place to build one of the most important brick factory of Barcelona: the factory of *Perelló*. Besides brick, the general abundance of resources on the territory encouraged the production of many other materials, such as: textile materials, paint, chemical products, glass and distillates. In this period the number of inhabitants of Les Corts increased from 360, in 1846, to 820 in 1860.

1870s – Despite the increasing of factories, this area somehow managed to preserve its rural aspect if compared to the intensive industrialization occuring in other parts of the city, like in the districts of *Sants* and *San Martí*. However, a historical study witnessed the birth of more than 250 factories in the territory, especially close to the paint factory of *Castells,* where, with the opening of the streets *Carrer de Morales* and *Plaça del Carme,* the new neighbourhood of *Camp de la Creu* started to take shape. In 1877 the line 15 of the tramway, that connected *Les Corts* to Barcelona's city centre, was extended until *Carrer de l'Anglesola*, one of the main access to the district at that time. In the 1860s the city of Barcelona lacked of services and space. The extensive lands of *Les Corts* became the ideal place to set a series of assistance services promoted by religious institutes. Since the ending of the decade the following institutes were built: the *Institut Frenopàtic*; the *Sant Joan de Déu* nursery school for poor people (1867); the *Bon Consell* nursery and school (1875); the *Casa Provincial de Maternitat i Expòsit* (1884), the *Hospital del Sagrat Cor de Jesús* for surgery (1885) and the *Sant Rafael* nursery (1888).



2.3 Distribution of the industries in the territory of Les Corts, 1927 (AMDC, Fons Martorell)

1880s – In 1884 the new municipality building was completed in *Plaça de Comas* encouraging, many industrial upper class families, to settle the area and to build their new residences. The *Güell* and the *Girona* family were among the most outstanding rich people of the city.
In 1872, the earl *Eusebi Güell* had inherited from his family an ancient building, already known at that time as *Torre Güell*. During the following decade he started an ambitious project to acquire properties around the original farm and, at the end of the 80s, the lands all together had reached an extension of 30.000 sqm. The whole complex took the name of *Finça Guell* where important architects, such as *Joan Martorell* and *Antoni Gaudí*, had the chance to work to rebuild some of the ancient farmhouses and design new gardens and fountains. Between 1885 and 1899 count *Güell* acquired new properties making the *Finca Güell* reach an extension of about 87 ha.

1890s – In 1897 the municipality of *Les Corts* was incorporated to the city of Barcelona. At that time *Les Corts* counted around 7.500 inhabitants and 502 buildings. It was an atypical case among the rest of the districts: it was the least populated, it had the lowest housing density and the least number of buildings. On the 20th April 1897 *Les Corts* officialy became part of Barcelona by the approval of a royal decree. One of the negative consequences of the annexation was the loss, for the inhabitants, of the opportunity to influence choices in political municipality matters, since *Les Corts* had always been characterized by a strong social and political cohesion between people.

2.4 Detail of the 'Plano de Barcelona y sus alrededores en 1890', J. M. SERRA, 1891

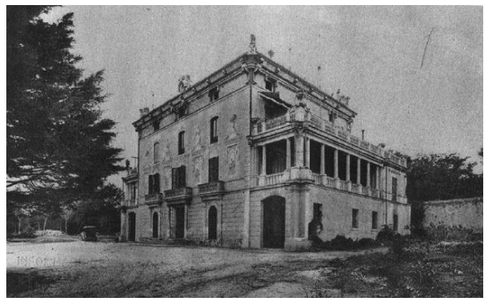
2.1.3 The building of the Palau Reial and the extension of the Diagonal

Starting from the beginning of the 20th century, Barcelona went through an intense phase of urban planning which had as main aim the connection of the *Eixample* district to the rest of the inhabited areas spread around the city. The necessity to connect periferic areas to the city centre, by the realization of new infrastructures, had as a main reason the hosting in Barcelona of the International Exposition of 1929. This further process of urbanization had finally great impact on the rural aspect of *Les Corts*.

In 1908 the *Avenida Diagonal* was opened from the actual *Plaça de Francesc Macià* until *Carrer de Sarrià* and was later further extended. Also, the area around the church of *Santa Maria del Remei* was characterized by urbanization works, in order to connect the front square to the other main streets of the district. All these improvements of the road network inevitably brought to the demolition of many of the ancient farmhouses inhabiting these lands.

In 1919 the *Güell* family decided to offer part of its lands to give the royal family a new official residence. In 1875, in fact, the royal palace went destroyed in a fire accident and, due to the lack of money, from that year on, the royal family had been living at first in the town hall building, in *Plaza jaume I,* and only later in the *Ciutadella* fortification. Count *Güell* offered a land portion of about 10,000 sqm, situated in *Les Cort*s, for the building of a new official royal palace. The project was commissioned to architect *Eusebi Bona* who designed a building consisting of the old core of the *Torre Güell*, plus two added wings on each side. However, for economic reasons, the construction of the palace kept proceeding so slowly throughout the years, that *Eusebi Bona* finally decided to resign.
The completion of the building passed to professor and architect *Francesc de Paula Nebot.* At that time he had been nominated as Deputy Mayor of Public Works and was also encharged of the reorganization of *Plaza de Catalunya*. In 1924 the building was completed, the royal family moved in and made of the *Palau Reial de Pedralbes* its new official residence.
The new configuration of the palace permitted to have access on the Diagonal exploiting the front garden. For this reason *Nebot* found it necessary to further extend the *Diagonal* route and give the royal palace a direct connection to the city centre. The *Diagonal* was already one of the most important existing urban road axis so, both *Nebot* and his project collaborator *Nicolau Maria Rubió i Tudurí*, decided to give to the new road section a different configuration from the pre-exsisting part. The new route was thought as a linear park, like an extention of the royal palace front gardens: from *Plaza Francesc Macià* towards the *Palau Reial* the *Diagonal* road section was widened from 50 to 80 meters and its northern side became a pedestrian space adorned with trees and shrubs.

The relocation of the royal family in the *Palau Reial* made all the town planning efforts of the years 20's and 30's of the century focus on the development of the *Diagonal* and its surrounding territory. The lack of urban landscape along both sides of such an important road was apparently felt as problematic so that, the designing of a new asset for this area, became a prority need. In 1925 the *Pla de l'Eixample de Les Corts* was approved. Its regulations expected the transformation of the rural landscape along the Diagonal in a luxury environment with isolated towers and green paths.

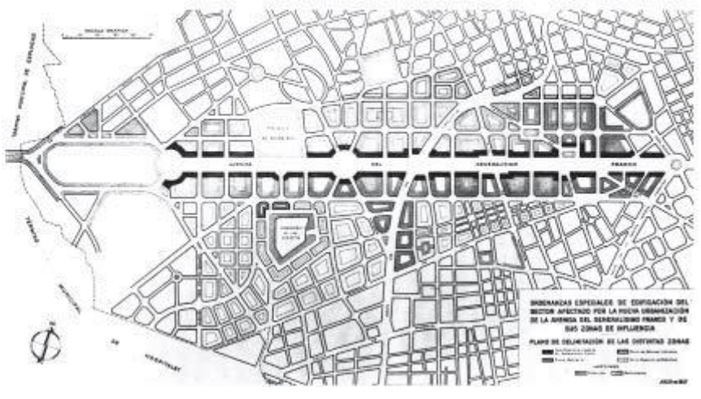


2.5 Can Custó (Torre Güell) in XIX century

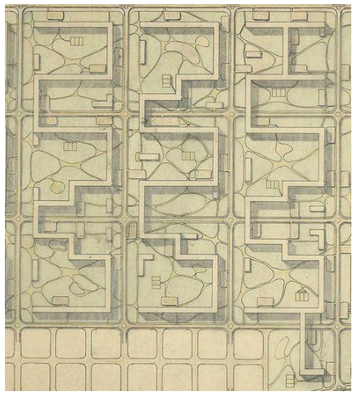
2.6 Opening of the Diagonal up to Palau Reial

2.1.4 Plan Macià and the explosion of the Spanish Civil War

With the turning of the monarchic system into a Republic the plan regulation of 1925 were abandoned and left place to many innovative and original projects. In 1931 a group of architects called GATPAC (Grup d'Arquitectes I Tècnics Catalans per al Progrès de l'Arquitectura Contemporanea) presented a project for the urbanization of the Diagonal which consisted of a series of tall rectangular-shaped isolated buildings arranged parallel to the road section and thickly disposed. Upstream the Diagonal instead the building texture was lighter with geometrical masses and free spaces in between to create a contrast with the irregular course of the landscape. Unfortunately the project was never realized due to the explosion of the Spanish Civil War in 1936. Same destiny had the Plan Macià, designed by the GATPAC group in collaboration with Le Corbusier in 1932. The plan contained all the aspirations and flaws of modernism readapting the Plan Cerdà to the new social needs. Itpaid great attention to the hygiene and green spaces for workers proposing a change in the municipal regulations and a riqualification of the ancient city.



2.7 Project for the urbanization of the Diagonal, GATPAC 1931



2.8 Detail of Plan Macià, GATPAC 1932

The years 20s and 30s of the century marked for Les Corts the starting of the installation on the territory of important sport equipments. In the following decades sport will become for the district one of its main characteristic feature. In 1922 *the Futbol Club Barcelona* decided to realize its first stadium close to the cemetery; between carrer de *Numància, Vallespir* and *Carrer de Marquès de Sentmenat*.Moreover, the *Reial Club de Polo de Barcelona* made of the area along the Diagonal its new headquarter in 1932.

The explosion of the Spanish Civil War shocked the social life of *Les Corts*. Many of the benefic buildings and associations established during the previous century were transformed into prisons: the *Bon Consell* nursery became a prison for women, instead at the end of the conflict it was used to imprison fascism political enemies.
Under Franco's dictatorship further urbanization and public works were made in the area. The Diagonal name was changed into *Avenida del Generalisimo Franco* and all plan interventions had the aim of increasing the road prestige by disposing along a such important axis a series of monumental building façades. When the *Universitat de Barcelona* realized the necessity of building a new campus to decentralize its headquarters, the lands of *Les Corts*, splitted in half by the Diagonal, were proposed as a possible location. It was the right opportunity for building useful public monumental buildings to finally transform the Diagonal in an avenue of rapresentation. However, the project for the campus presentend by the architect *Francesc Nebot*, was never realized and the variuos faculty buildings sprang up little by little without following a unitary project.

At the end of World War II Franco's dictatorship was not well-regarded by the rest of the democratic European countries because of its closeness to fascism ideals, but the starting of the Cold War, USA was looking for allied to avoid the spreading of comunism and Franco decided to take advantage of this opportunity. In 1952, Franco promoted the organization of an Eucharistic Congress in the city of Barcelona as a simbolic political opening to get the country out of the international isolation in which it had fallen. With this excuse all the area surrounding the road section of the Diagonal, at the height of *Plaça Pius XII*, went through an operation of demolition: 150 shack settled during the ending of the war dissapeared. The 'cleaning' intervention and the realization of new infrastructures renewed the access to the city until the *Palau Reial* making it look much better.

2.1.5 Plan Comarcal and its special plans

In 1953 a new urban plan, conceived by the architect *Josep Soteras* and passed to history as *Plan Comarcal*, was approved for the city. This plan wanted to generate a crown of indipendent urban cores, each one with a proper identity, in order to avoid the spreading of the city, according to the traditional metropolitan growth scheme. For this reason it had a very general setting and left the task to establish more specific guidelines to a series of partial plans that also had the administrative power to change the instructions of the main plan. The problem was that no boundaries had been clearly specified, so the partial plans became a way to open the doors to building speculation in their area of interest. Two outstanding example of such a bad urban planning politic are the realization of the new FC Barcelona

stadium in 1957 and the starting, in 1970, of the construction works for the *Ronda del Mig*, the first city highway section of Barcelona.
The partial plan interesting the area of the western end of the *Avenida del Generalismo* Franco was commissioned to architect *Josep Soteras i Mauri* and was approved by the municipal architect *Llorenç García* in 1956. As established in 1953, this plan affected the lands located along the Diagonal from *Plaça Pius XII* untill the end of the city boundaries and had as main aim the organization of the new university campus. In those years the FC Barcelona wanted to build a new stadium that could satisfy the new football team needs. In 1950 the lands intended for the new faculty buildings were bought and became property of two different entities: the Universitat de Barcelona and the FC Barcelona. Due to the reorganization of the academic asset that was happening during those years, the construction of the campus and its sport equipments went on very slowly. At the same time the FC Barcelona had problems in finding an adequate extension of land to build the new stadium and selling the property of the old *Camp de Les Corts*. Finally, in 1954 the FC Barcelona bought the lands next to the pavillion of *Maternitat*, including the property where the ancient farmhouse of *Can Planes* arose.
The designing of the new stadium was commissioned to the same architects *Josep Soteras i Mauri* and *Llorenç García* who were also finalizing the partial plan of the area. The stadium Camp Nou was built in no more than 4 years.
According to the plan Comarcal the land where the old stadium arose, was supposed to be sold as a private green space. However, after the opening of the Camp Nou, the partial plan misteriously changed the soil destination into an intensive building area which was sold to a building constructor for a large amount of money. It was one of the worst speculation episode that took place during those years.
In 1982 a *Miniestadi* was annexed while the *Camp Nou* was widened to increase its capacity to 100.000 spectatores and making it one of the largest stadium of Europe. In 1956 the FC Barcelona decided to extend its properties buying the lands of another two farmhouses: *Can Granota and Casa Xica d'en Guerra*. In 1971 the *Palau Blaugrana* and the ice skating ring were opened while, the *Palau Blaugrana 2* was built along the *Travessera*, in 1975, to host the club's female basket team.

Fig. 2.9 FC Barcelona old and new stadium, 1957

With the carrying out of Plan Comarcal's partial plans, *Les Corts* went through a period of intensive urbanization that almost outlined the actual morphology of the district.
During the 60's many residential buildings, hotels and offices were realized so that the district, already splitted into two by the Diagonal, started assuming different features depending on the geographic location of the areas respect to this axis. Residential and luxury buildings focused on the north part of the road; sporty and academic bodies concentrated on the south part, while residential and intensive urbanization in the remaining areas. The largest sporting centres such as *Club Esportiu Laietà*, *Reial Club de Polo* and *the Reial Club de Tennis*, were born or widened during this decade making, together with the FC Barcelona and UB equipments, the district of Les Corts one of the most sporty area of the city. Instead, La Talaia and Monitor buildings; the Trade, Les Escales Park, La Caixa headquarters and Cervantes tower are some of the most important examples of office buildings.

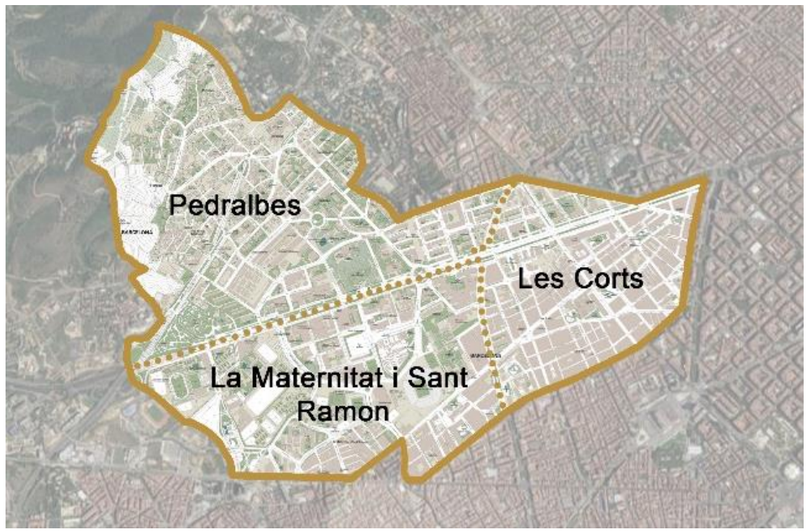
2.1.6 The PGM and the Olimpic Games of 1992

In 1974 Franco's dictatorship came to an end and the new democratic government promoted a changing in the urbanistic city politics. In 1976 the new *Pla General Metropolità d'Ordenació Urbana* (PGM) was drawn up marking a clear cut with the old and inadequate partials plans. Furthermore, with the subsequent organization of the city territory in districts in 1984, each district institution had the power to participate in the urban planning of its own area.
When in 1986 Barcelona was chosen as the holding city for the Olimpic Games of 1992, Les Corts underwent one of the most significant transformation process, since the district appeared among four olimpic city areas. *Montjuïc, Vall d'Hebron, Vila Olimpica* and *Diagonal-Les Corts* were all chosen for their previous lack of urban planning and their need to be reorganized. In *Les Corts*, in particular, in the boundary areas with the city of *Esplugues de Llobregat* and *L'Hospitalet de Llobregat* a moltitude of illegal shacks had sprung up next to the *Reial Club de Polo*, the *David Lloyd Club Turó* and the *Club Esportiu Laietà*. The urban regeneration just consisted in the building of the five star *Rei Juan Carlos I* hotel which was seen as a perfect choice considering its perfect location at the southern access to the city and its proximity to a series of luxury sporting centres. Further urbanistic intervention were made to underline the limits of the district with the neighbouring areas.

In more recent times the urban plans made the choice of improving and regenarating the urban layout by smaller scale interventions. *Les Corts* has been equipped with: new public transport lines, such as the tramway crossing the area until the Diagonal (2004) and the new metro line L9 (2016); services for the inhabitants, such as the Arxiu Municipal del District; cultural centres; the public library *Miquel Llongueras*; memorial and green areas, such as the ancient location of factory *Casimir Vicens*. Also, some emblematic buildings were realized: the *Palau de Congressos de Catalunya* (2001) and the *UB Parc Cientific de Barcelona* (2003).

2.1.7 The actual district of Les Corts and its neighbourhoods

Today the distric of Les Corts is made up of three neighbourhoods: Pedralbes; La Maternitat i Sant Ramon; Les Corts.



2.10 District of *Les Corts* (Own creation with Google Maps and ICGC images)

All together it counts 81.708 inhabitants, which represent only the 5.0% of the city's population. If compared to the rest of Barcelona's districts it has a net density lower than the average.

DISTRICTS	INHABITANTS	PERCENTAGE	EXTENCION (ha)	DENSITY (in./ha)
CIUTAT VELLA	102.138	6%	436,8	233
EIXAMPLE	266.754	16%	747,6	356
SANTS-MONTJUïC	182.184	11,20%	2.294	79
LES CORTS	81.708	5,02%	601,8	136
SARRIA'-SANT GERVASI	148.172	9,11%	2.009,30	323
GRACIA	120.907	7,44%	418,6	603
HORTA-GUINARDO'	170.249	10,47%	1.194,70	142
NOUS BARRIS	168.327	10,35%	804,1	209
SANT ANDREU	148.560	9,14%	656,5	226
SANT MARTÍ	237.112	14,58%	1.052,40	225
Total/Average	1.626.111	100%	10215,8	253,2

2.11 Statistics research (Own creation according to data collected by the Ajuntament de Barcelona, 2018)

The EPSEB faculty building is part of the university campus, situated in the neighbourhood of *La Maternitat i Sant Ramon*. This neighbourhood bounds with the municipality of *L'Hospitalet de Llobregat* outwarding the city, while touches the neighbourhood of *Sants* on its southern side. It has an intermediate extention among the neighbourhoods of the district, with a population density lower than the average.

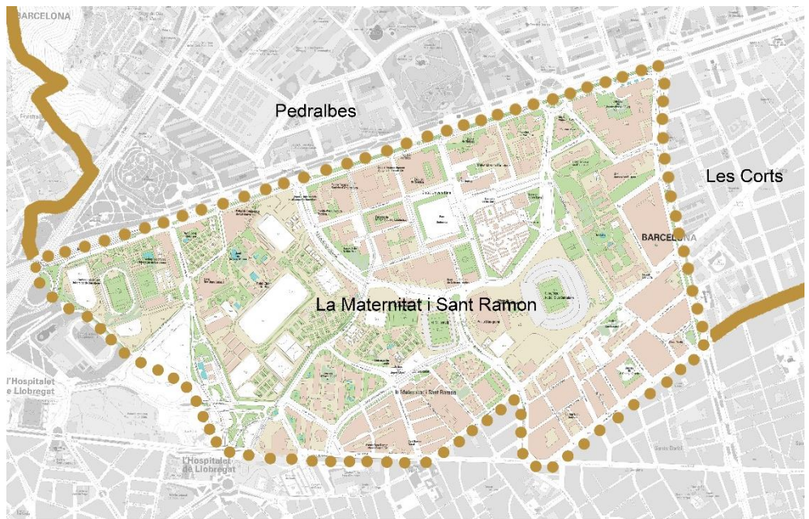
NEIGHBOURHOODS	INHABITANTS	PERCENTAGE	EXTENCION (ha)	DENSITY (in./ha)
LES CORTS	45.976	56,27%	141,3	326
MATERNITAT I SANT RAMON	23.868	29,21%	190,3	126
PEDRALBES	11.864	14,52%	270,2	45
Total/Average	81.708	100%	601,8	165,67

2.12 Statistics research (Own creation according to data collected by the Ajuntament de Barcelona, 2018)

The neighbourhood is mainly characterized by the presence on its territory of university buildings and sport equipment. Together, they reach more than the 50% of the economic activities carried out in the neighbourhood. The remaining main sectors are distributed between job (14,2%), touristic (11,1%) and commercial (9%) activities.

Indeed, Maternitat i Sant Ramon hosts one of the biggest football stadiums of Europe: Camp Nou. This stadium, property of FC Barcelona football team, attracts every day both Catalan people and tourist coming from other countries. Moreover, other important sport equipment such as *Real Club de Polo* and other structures surrounding the *Camp Nou*, which are further properties of the FC Barcelona, also attract people from outside the neighbourhood.

For what concerns teaching, the presence of most of the faculties belonging to the most important universities of Barcelona clearly remark the academic character of the neighbourhood and the history of its urban development.



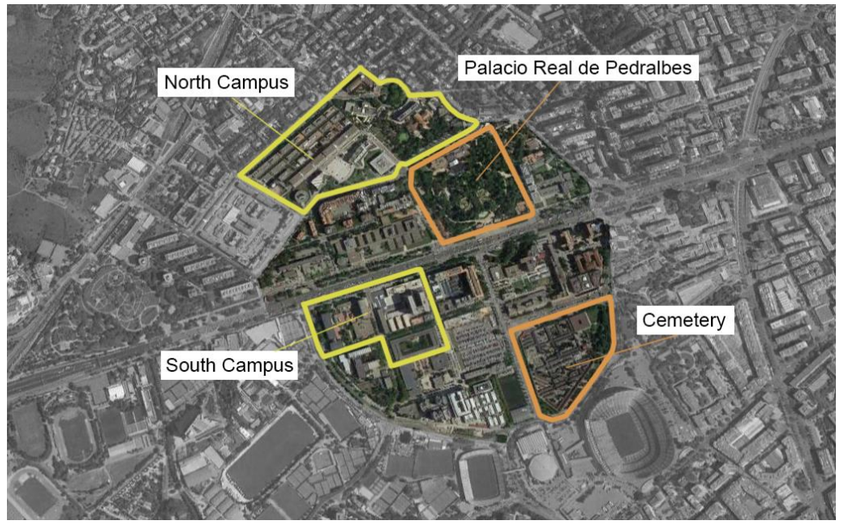
2.13 Neighbourhood of La Maternitat I Sant Ramon (Own creation with ICGC images)

2.2 ZONA UNIVERSITARIA: BIRTH AND EVOLUTION

2.2.1 Introduction

The area we call today Zona Universitaria is located in the district of *Les Corts*, splitted by the Avenida Diagonal between the neighbourhoods of *La Maternitat i Sant Ramon* and *Pedralbes*. All the area has a quite regular circular shape and it is delimited by the streets: Avenida del Doctor Marañón and Avenida de Juan XXIII, on the South side and Avenida de Pedralbes, Passeig del Tillers, Calle de Dulcet, plaza de Eusebi Güell, Calle de Sor Eulalia de Ancizu, Calle del Gran Capitán y Avenida del Ejército, on the north side.

All the area is made up of the Campus de la Diagonal "*Portal de Coneixement*", which is part of the Universitat de Barcelona, and the North and South Campuses belonging to the Universitat Politècnica de Catalunya. Besides the various faculty university buildings the Zona Universitaria also includes the ancient *Palacio Real de Pedralbes* and the municipal cemetery.



2.14 Zona Universitaria (Own creation with Google maps images)

2.2.2 The idea of a new university campus

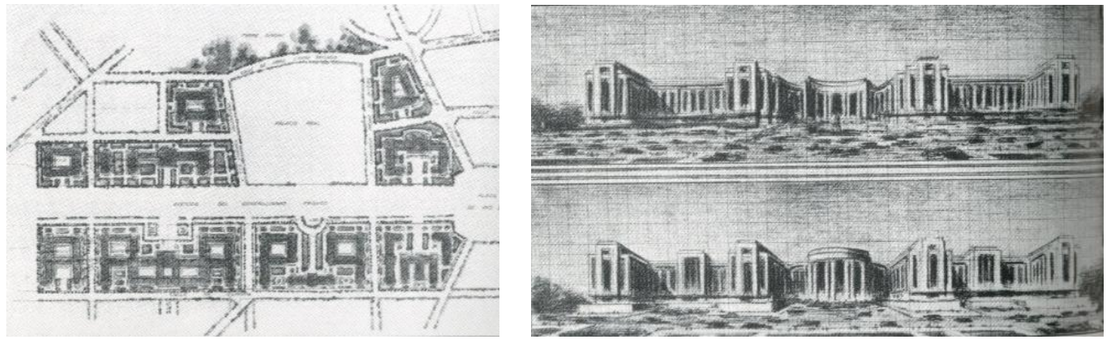
Until 1968 the *Universitat de Barcelona* (UB) was the only existing academic institution of all the territory of Catalunya and Balearic Islands. Since 1882, all activities and administration procedures carried out by the institution were held in the ancient building placed in *Plaça de la Universitat*, designed in 1863 by Elies Rogent.

At the end of 1940s, the number of enrollments and political agitations organized by the students, against Franco's dictatorship, kept increasing constraining the UB to look for a new site to decentralize and widen its headquarters. For this reason, in 1950, was created the *Junta d'Obres* for the new *Ciudad Universitaria* of Barcelona which was in charged of the designing of a new university campus and to manage any necessary negotiation and expropiation procedure.

The choice of the future campus location between two possible options became reason of political discussions. One solution was suggested by the city's municipality which had offered the university some public lands situated on the Montjuïc not far from the area where the International Exposure of 1929 had taken place. This solution was encouraged by the politically less interested part who saw the closeness to *Plaza de Espanya* and the less economic expenses as an advantage. The second option was to build the campus on the lands surrounding the west end of the Diagonal. This solution was obviously more expensive than the first one because the lands still belonged to Barcelona's well-off and important families (such as the Güell family) and needed to be expropriated. Moreover, the campus would have been splitted in two by the presence of the Diagonal that literally went across the lands causing the loss of a unitary idea of campus.

Against all reasons, whereas the *Junta d'Obres* was involved in political affairs, the choice fell on the last option which had as second aim the tansformation of the Diagonal in a urbanized monumental axis. All social and academic oppositions made by important architects such as *Grup R* were good for nothing to make the *Junta d'Obres* change opinion. The fundings were allocated by the *Ministerio de Educación Nacional* and the project was inserted as a special plan as part of the main Comarcal urban plan of 1953. As taken into account, most part of the fundings were spent for the expropriation of the area since the rich owners knew how to make profits out of the selling of their lands .

The designing of the plan was commissioned to the architect *Francesc de Paula Nebot i Torrens* who realized the preliminary campus project in 1953. The idea at the base of the project shows the architect's will to create a monumental environment in order to reinforce the Diagonal character of great stately walk. The unpretentious presence of the *Palau Reial* is compensated by the imposing buildings of the faculties that mark a built rhythm beyond the front gardens. However, Nebot project was hardly critized for its evident aesthetic idea of fascist classicism and was never realized. Finally, the idea of a unified project was abandoned and a series of project competitions were held, one for each faculty building, making the *Zona Universitaria* gradually define only by a succession of indipendent punctual interventions.



2.15 Project for the University Campus (Francesc Nebot, 1953)

2.2.3 Birth and growth of the South Campus

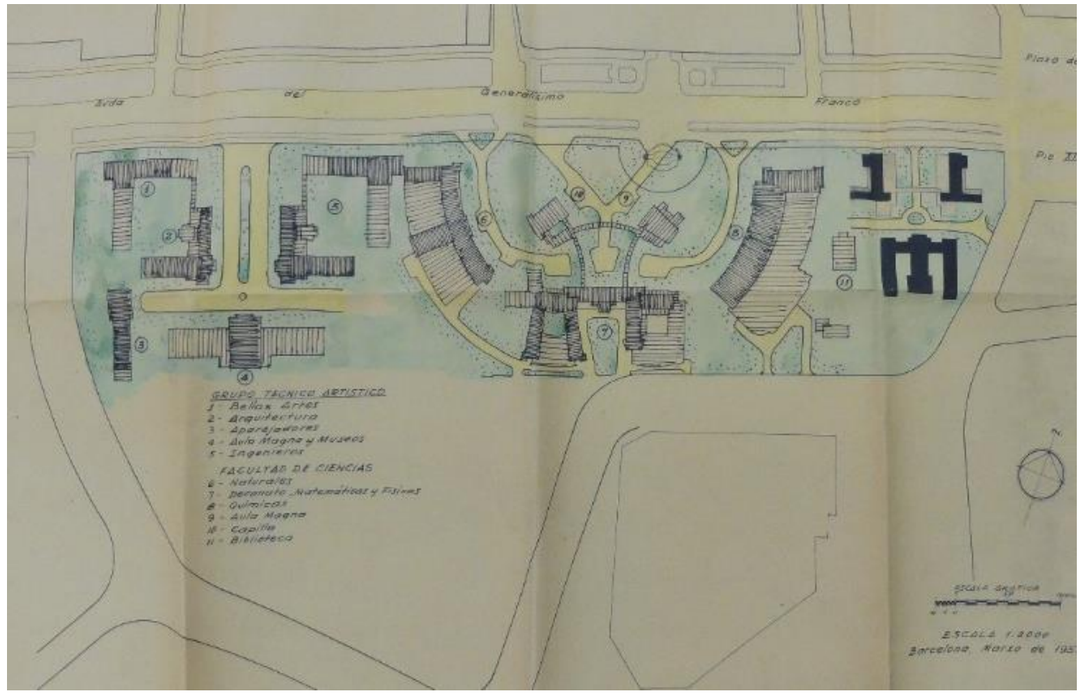
The first buildings realized on the South side of the Avenida Diagonal were the *Facultat de Farmàcia* (1950-1957) and the schools of *Sant Raimon de Penyafort* and *Nostra Senyora de Montserrat* in 1959. These two schools constitute today a unified nucleus.

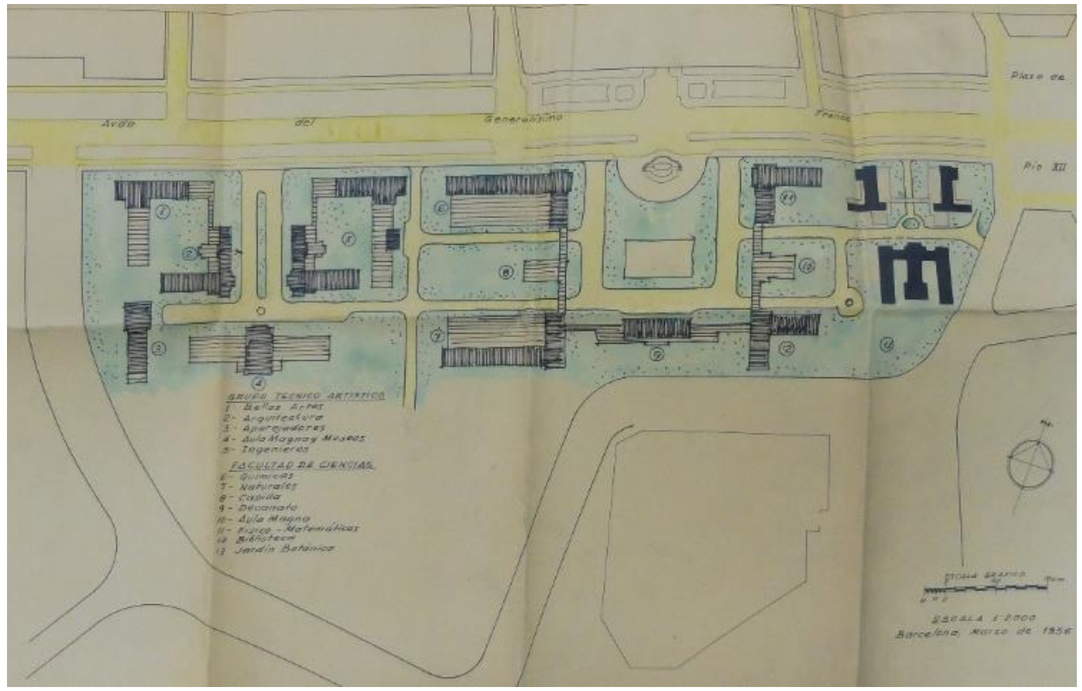
The earliest architectures of the area were characterized by a marked monumental academic style, typical of Franco dictatorship. Only later buildings instead were commissioned to more avant-garde architects who achieved some realizations of great architectural interest. A striking example is the *Facultat de Dret*, designed in 1958 and completed in the same year in order to give an immediate solution to the increasing student political protests. The use of prefabricated components in the construction of the building gave the façade an appearance of technological progress for that time and opened the way to the acceptance of international architectural influences.

If at the beginning of the process the *Universitat de Barcelona* (UB) was the only existing university, during a period of 50 years, various academic entities were born. In 1968 the *Universitat Autònoma de Barcelona* (UAB) was established, while in 1971 the *Universitat Politècnica de Barcelona (*UPB) was founded in order to group scientific faculties under a unique academic institution. Only later in 1984 the UPB changed its name into *Universitat Politècnica de Catalunya* (UPC).

In the 1960s the process of construction of new schools and university buildings continued along the south side of the Diagonal without an established urban plan. Between the 60's and the 90's the following buildings were realized:

- *Escuela Tècnica Superior de Arquitectura* (1957-1961) at that time was part of the UB, were transferred in the new faculty building designed in 1957 by the architects *Pelai Martínez Paricio; Eusebi Bona Puig* and *Josep Maria Segarra Solsona*. After the birth of the UPB, in 1973, the building was widened between 1978 and 1985, by the architect *Josep Antoni Coderch*. The library was added only in recent times in 2009 by *Jaume Sanmartí i Verdaguer*;
- *Escuela de Apparelladores* (1957-1961) designed by *Pelai Martínez Paricio; Eusebi Bona Puig* and *Josep Maria Segarra Solsona*;



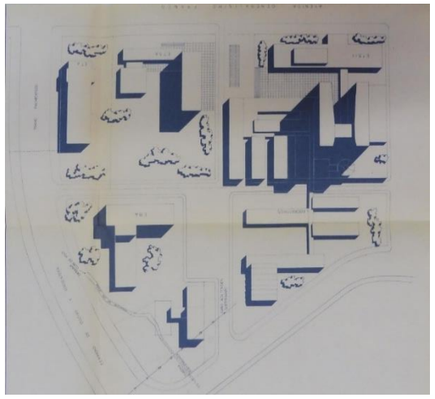


2.16 Layout proposals for the UB university campus, 1956 (Archive UB)

- *Escuela Tècnica Superior de Enginyeria Industrial de Barcelona* (1959-1964) designed by *Robert Terrades Via*. The faculty moved in the new building from the ancient factory of Can Batlló;
- *Facultat de Ciències* (1966-1969), designed by J.M. Romero Aguirre. With the splitting of the faculty in the independent faculties of Chemistry and Physics, a new building was constructed to host the Facultat de Física at the end of the 80's. Later, in 2006 it was widened doubling the starting surface.
- *Facultat de Geografia i Història and Facultat de Filosofia i Ciències de l'Educació* (1967) both designed by J.M. García Valdecasas Salgado and Robert Terrades Vía. All the complex was known as 'the domes.
- *Facultat de Belles Arts* (1979);
- *Facultat de Biologia* (1978-1982) designed by architects *J.C. Cardenal Gonzàles, J.A. Ballesteros Figueras* and *F. de la Guardia*;
- *Facultat de Geologia* (1984-1988) designed by *J.A. Martínez Lapeña* and *Elies Torres I M. Usandizaga;*
- *Facultat de Matemàtiques I Estadística (1992-1993).*

From the original idea of a unified campus of 1950, the result of today's Zona Universitaria layout is a result of a series on independent interventions basically moved by the necessity of bigger spaces for academic activities but also by the changing, during the years, of universities social and educational needs.

2.17 Orthophoto Zona Universitaria, 1957 (ICGC)



2.18 Layout proposal for UB south campus

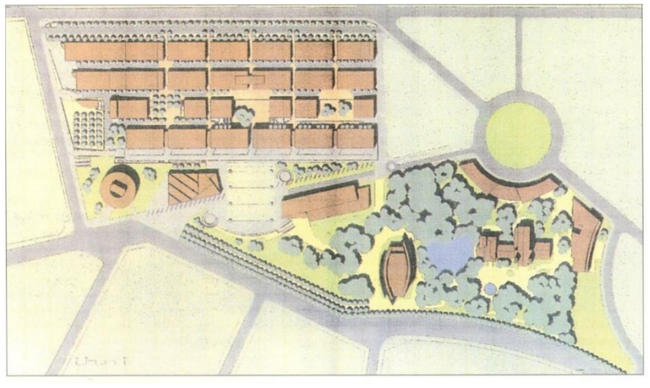
2.19 First faculty buildings of the Zona Universitaria, 1960

2.2.4 The special plans of 1992

At the end of the 80s most part of the faculties belonging to the UB had moved from the ancient building to the new campus in *Les Corts*, but the lack of a global plan led to punctual construction interventions which in some cases had to be reorganized in the following years.

In 1986 Barcelona was chosen as the town holding the Olympic Games of 1992. In those years the city had the necessity to solve old urban problems that affected various abandoned areas surrounding the city centre. This international event became the opportunity to find enough financial resources to give the city a new urban identity by recovering the abandoned areas with new facilities and modernizing the road network. The main interventions were made on the hill of *Montjuïc*, along the coastal area North of *Barceloneta*, in the neighbourhood of *Vall d'Hebron* and along the *Avenida Diagonal*. All these urban transformations were carried out following the general urban plan realized by the architect *Josep Antoni Acebillo i Marín*. In these main urban guidelines, some special plans were also established and approved to recover specific areas of the city.

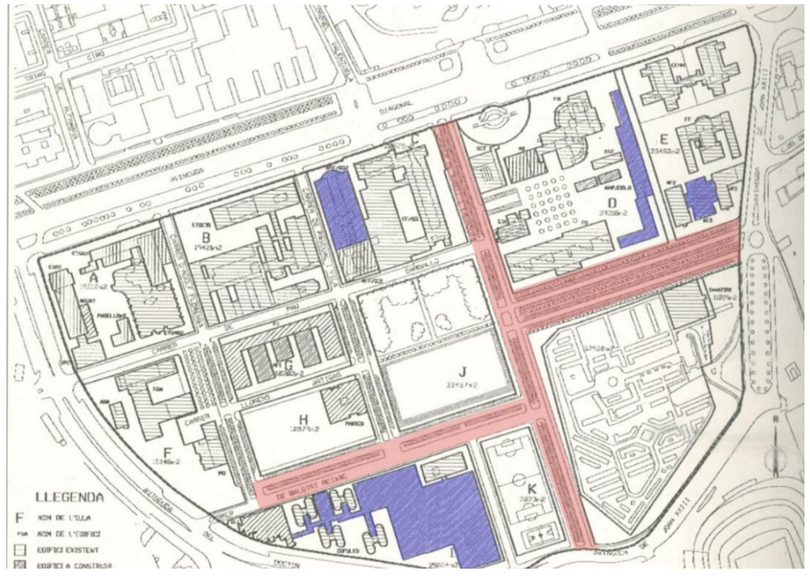
In July 1992 the *Universitat Politècnica de Catalunya* obtained some building plots carrying out a series of expropriations in the district of *Les Corts*. An area of 12,1 ha located north of the *Avenida Diagonal* was intended for the construction of a new university campus made up of two sectors. The first one holding a grid layout system of pavilions to house all didactic and administrative academic needs and the second one with independent buildings hosting the general university services. This area is known today as the UPC North Campus.



2.20 Special plan for the UPC North Campus, 1992

Later, in 1994, a new special plan was held for both *Universitat de Barcelona* and *Universitat Politècnica de Catalunya* universities in order to reorganize the southern area of the *Zona universitaria*. An extension of 34 ha was split between the two universities and Barcelona municipality to give place to new academic buildings and design a new road network. All pre-existent buildings were mainly preserved; the faculty buildings of Physics, Chemistry and Pharmacy were widened; a new building was realized for the faculty of Biology; some buildings were connected between them by new structures while a main road passing along the cemetery and intersecting two secondary transversal streets were realized as urbanization works.

2.21 South campus layout before 1994



2.22 Special plan proposal for the South campus, 1994

2.23 South UPC Campus, 2009

2.3 HISTORY AND EVOLUTION OF THE FACULTY BUILDING

2.3.1 Introduction

The birth and architectonical evolution of the EPSEB building is strictly connected to the historic evolution of the academic organization of technical studies in Spain. Here follows a brief history of how the two things developed together during the 20th century:

At the beginning of the 1920s the school of Architecture was part of the UB and had its own place inside the left wing of the building placed in *Plaça de la Universitat*. In 1924 a Royal ordinance established that all schools of surveyors, that since then had been associated with schools teaching industrial studies, had to be incorporated by the schools of architecture. At this point the school of surveyors was transferred in *Plaça de la Universitat* too and the spaces reserved to the school of architecture had to be shared between all students.
The new organization of studies underlit the secondary role that the profession of surveyor covered in comparison to the architect's position and it also gave birth to a difficult management of the teaching spaces that meant to be shared between the two schools. Moreover, the school of surveyors did not have a proper legal entity still and the professional figure of the surveyor was not defined by specific competencies. Due to a general discontent and to the changing of the political scene, if in 1924 this condition of subordination was apparently accepted, during the following years the necessity to establish the bounds of each profession became more and more evident.

In 1931 Spain was no longer under a monarchic form of government but it converted into a Republic. From 1931 until 1934 the government approved various decrees in order to solve the professional conflict, but without reaching a reasonable solution. Only in July 1935 a new decree clearly establishes the new bounds of competence of each profession putting finally an end to the conflict between architects and surveyors. This decree will be in force until 1971.

In 1936 a new political crisis took place and caused the explosion of the Spanish Civil War. During these years many professors and students were forced to abandon the academic environment to join the army. The school just carried on the essential administration work and end up by remaining almost an empty building. In the meantime, the *Escuela de Arquitectura* became a cultural institution and passed under the direct control of the Catalan government (Generalitat de Catalunya).

With the ending of the war and the establishment of Franco's military dictatorship the school went back to normal and all activities were restored. An order of 1940 suggested that surveyors and architecture studies should have been kept separate, it was the starting of a process that would have slowly led to the separation of the two academic careers.
Since 1945 the number of people enrolling to the school of surveyors began to grow, although most of them did not have an adequate preparation to continue the studies, so the access to the school became restricted.

In the '50 the 'Spanish miracle' took place; the country experienced a phase of economic and social evolution that encouraged more and more people to pursue a career. At the same time, a general reorganization of the global asset of the Spanish schools led to an increasing of the number of professors and the school of surveyors started finally to achieve a certain internal autonomy from architecture.
After five years, the number of students became so unbearable for the limited spaces allocated to the school, that the *Universitat of Barcelona* decided to include in its new project for the Campus de Pedralbes the building of an independent structure dedicated to Surveyors.

2.3.2 The preliminary project for the school (1955-1956)

The designing of the new building for *the Escuela Tecnica de Apparejadores* was included in the main project for the new university campus of Barcelona. The original core of the campus was made of a series of faculties belonging to two different branches:

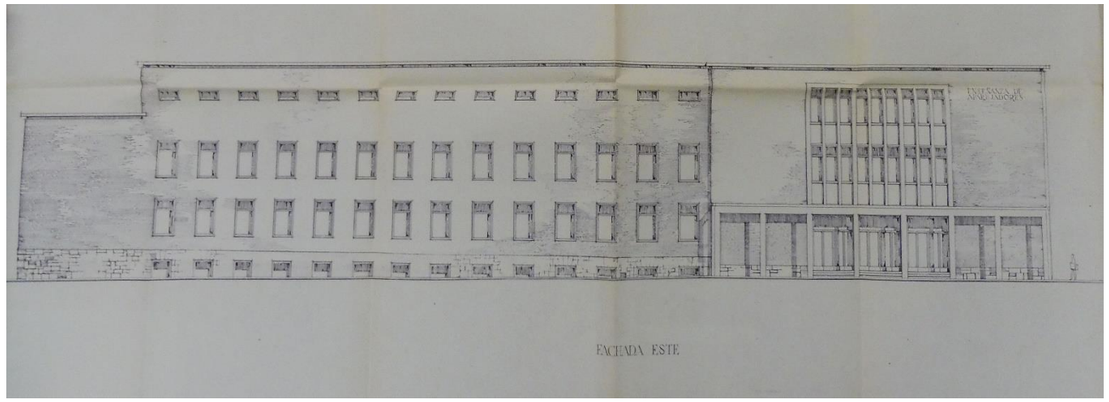
- Technical and artistic sector, including the buildings destined to fine Arts; Architecture; Survey, Engineer and a museum with a great hall
- Sciences sector, including Chemistry, Natural sciences, Physics and Mathematics and a library.

For this reason, the buildings for the *Escuela de Arquitectura*, *Escuela de Apparelladores* and fine Arts were designed by the same team of architects:

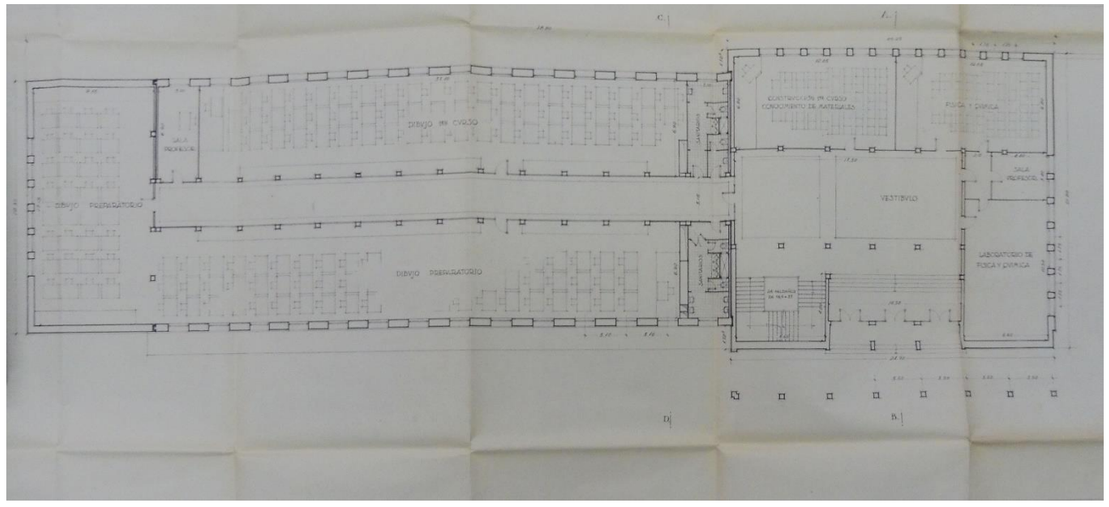
- *Eusebi Bona Puig;*
- *Pelayo Martínez Paricio;*
- *Josep Maria Segarra i Solsona*.

They were all catalan architects: *Pelayo Martinez Paricio* was architect and professor in the *Escuela de Arquitectura* while *Eusebi Bona Puig* had collaborated with *Francesc Nebot* to the redesigning of the *Palau Reial*, between 1919 and 1924. The preliminary project was published between 1955 and 1956.

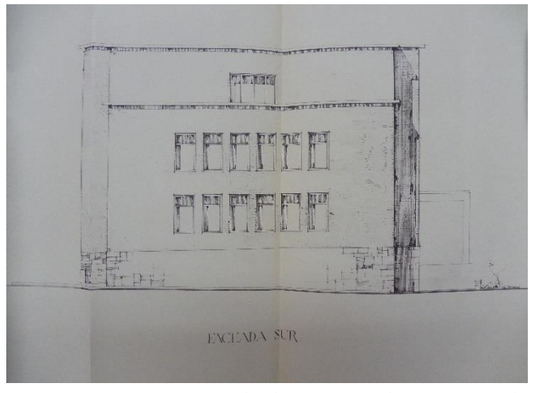
In the archive picture we can see that the building was made up of a basement and three floors above ground. The last floor had a terrace while the entrance was remarked by prominent front porch surrounded by eight square pillars. The style is typical of those years, with definite and simple geometries characterizing the elevations.
In the urban layout, the building was oriented with the wider volume pointing north and the access to the faculty occurred on the East façade, on the opposite side where it is now located, facing the faculty of architecture.
The structure consisted in a skeleton of reinforced concrete pillars supporting the horizontal and vertical closures while the stairs were thought to be realized by readymade elements.
The exterior geometry and the structure are very similar to the ones of today's building. However, due to problems linked to the change of the academic asset the project was never realized.

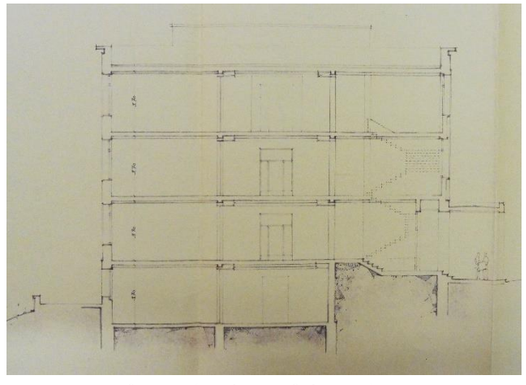


2.24 East elevation, preliminary project of 1955 (Archive of the UB)



2.25 Ground floor plan, preliminary project of 1955 (Archive of the UB)



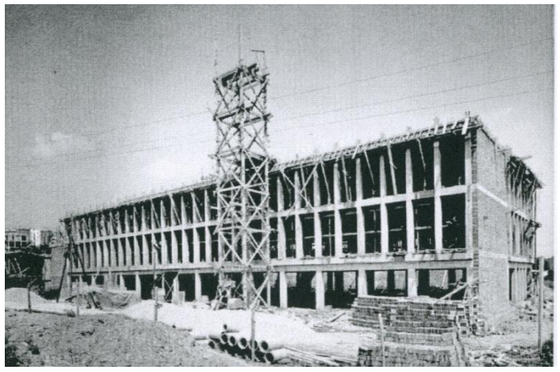


2.26 South elevation and section, preliminary project of 1955 (Archive of the UB)

2.3.3 The final project and the building of the school (1958-1962)

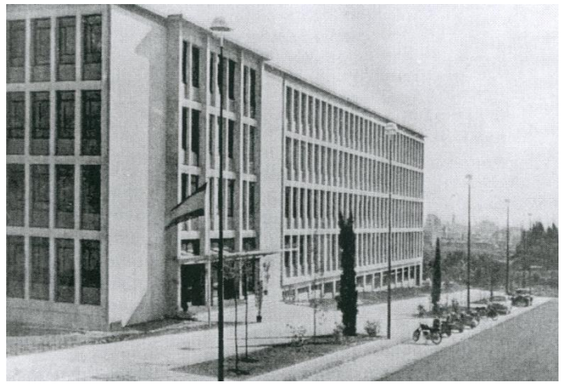
In 1957 a new law was promulgated to reform the whole organization of technical studies in Spain. The aim was to homologate the preparation level of students coming from professional schools of different sectors.
The law stablished the administrative separation between the School of Architecture and the School of Surveyors giving the school the name of *'Escuela Tecnica d'Aparejadores'*.

During these years the original project proposal of 1955 underwent many changes to adapt the previous structure to the new needs. At first, a building of 5.500 sqm had been expected but, with the changing of the laws and the continuous growth of the number of students, the Ministry gave the school administrations the approval to extend the building surface to 8.500 sqm by adding a fourth floor. In December 1958, while the construction works had already started, the new final project was approved. In 1960 the building was completed and in 1961 it was recognized as the new official teaching structure.



2.27 Construction of the West façade, 1960

The new building was structured on four floors: a basement taking advantage of the sloping ground conformation, a ground floor and three upper floors. If compared to the previous project, the elevations are characterized by a higher number of openings, here they become the cornerstone of the façade and give rhythm to all the architecture. The entrance was transferred on the west façade and was made less monumental removing the prominent front porch with pillars and remarking the main access with a simpler porch roof.



2.28 The faculty building, 1962

Under Franco's dictatorship designers were not free to express themselves, architecture was under the power's control and had to follow specific imposed monumental and classicist standards. The realization of the Zona Universitaria should have been an opportunity to give birth to new ideas and architectural experimentations, but in the political scenary of that time Spain remained isolated from the rest of the avant-garde architectural movements and only the most recent faculty buildings were designed with an opening to European influences.

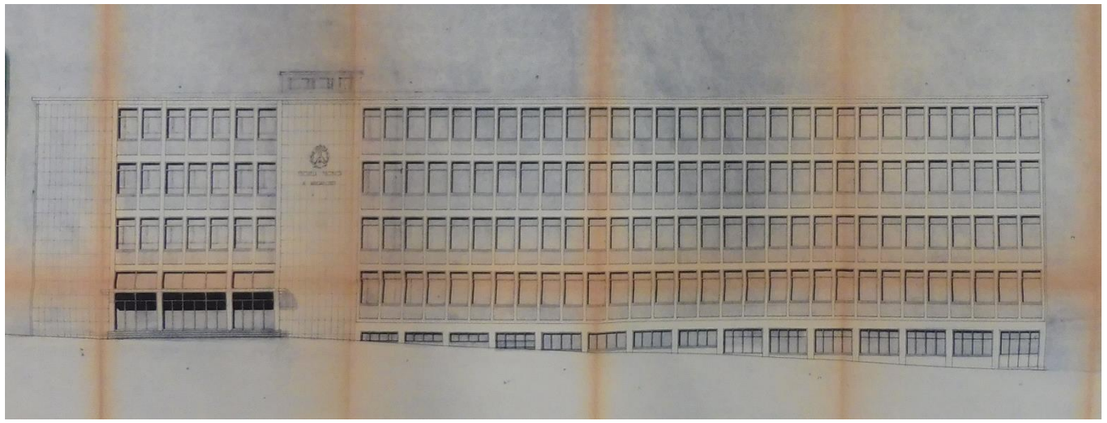
In 2012 *Augustí Portales Pons* carried out a study that had the building as the main topic. He describes the façade as:

'[…] strongly regulated by imposed standards belonging to the official dictatorship's architecture, presents compositives solutions, at the same time, more humble and daring than the Architecture's vein itself. '

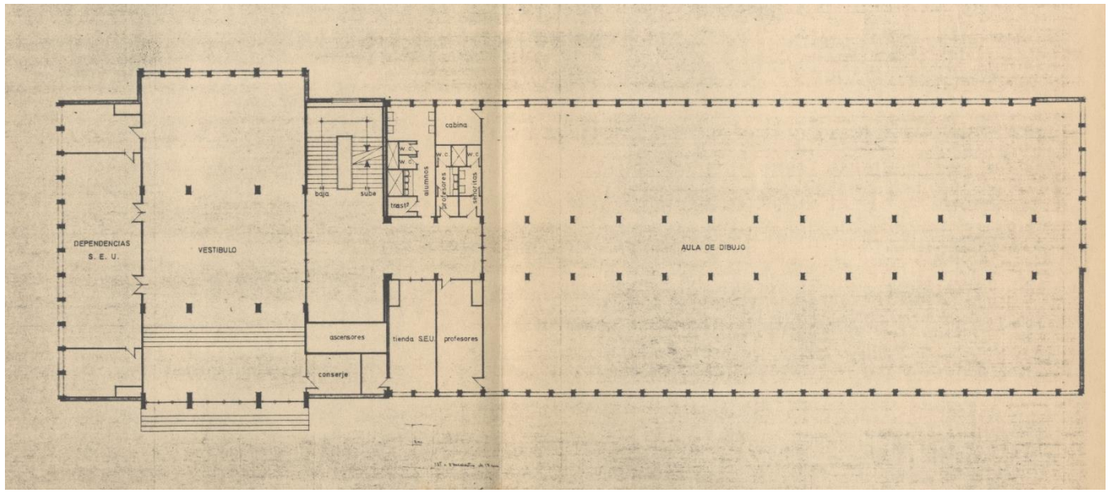
For example, the simple use of innovative materials was for that period an opening towards international architectonical languages and some architectonical solutions of this kind we can actually find in the building. The most evident ones were:

- the application of a light coloured limestone coating instead of the dark and severe granite stone, typical of the power's official architecture;
- the glass and reinforced concrete porch roof;
- the use of polished alluminium profiles for the windows;
- the choice of a long lasting inoxidable metal handrail for the stairs.

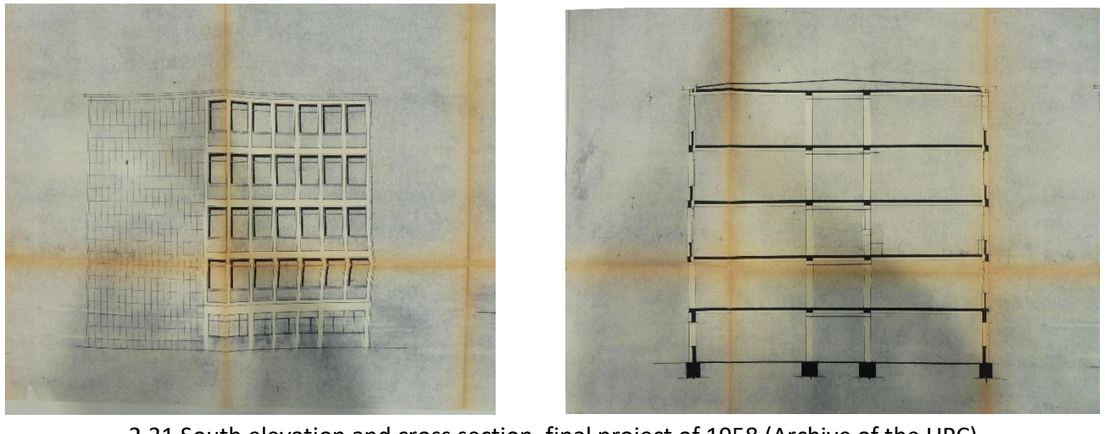
All these elements express a voluntee of innovation and opening to new solutions, even if different from the spanish traditional style.
The structure is made of reinforced concrete pillars and beams supporting vertical and horizontal closures. The slabs are made of hollow flooring blocks, drowned in a layer of reinforced concrete.



2.29 West elevation, final project of 1958 (Archive UPC)



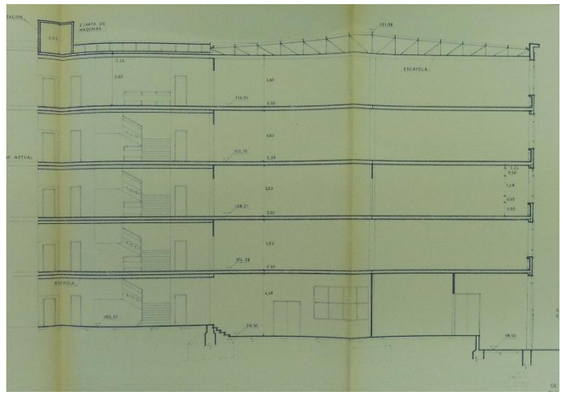
2.30 Ground floor plan, final project of 1958 (EPSEB Library)



2.31 South elevation and cross section, final project of 1958 (Archive of the UPC)

2.3.4 The first extension of the building (1969-1973)

In 1966 a changing of the rector of the school took place and the new administration decided to extend the faculty building due to the continuous growth of enrolments. When the new part was inaugurated, the maximum capacity of expected students during the following years was lower than the effective number of enrolled students. If the building was designed to host a maximum of 300 students, in the following years the number was of 1.500. The new project was commissioned to the Ministry's architecture *Felipe García Escudero* and was later approved in 1968, after some changes in the original plan. It provided the realization of a new volume to juxtapose to the main building for a total surface of 5.250 sm. The new part would have arisen on the southern façade of the pre-existing structure, practically extending the total length of the faculty along the *Avenida del Doctor Marañon*.



2.32 Cross Section, F. G. Escudero,1969 (Archive of the UB)

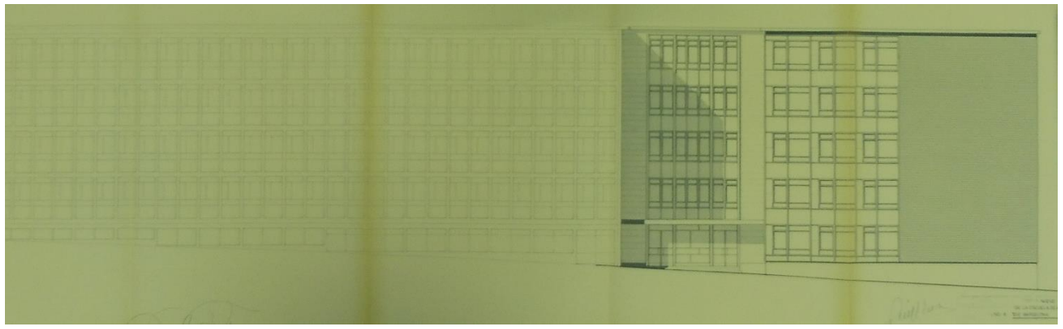
In 1970 the construction company that was carrying out the work execution of the new building, called Construction Pujol SA de Sabadell, failed and left the structure uncompleted. The steel structure and the covering were finished but vertical closures, finishes and facilities were still missing.

In 1971 the *Universitat Politecnica de Barcelona* (UPB) was established and the school became part of it under the name of *Escola Universitària d'Arquitectes Tècnics* (EUAT).

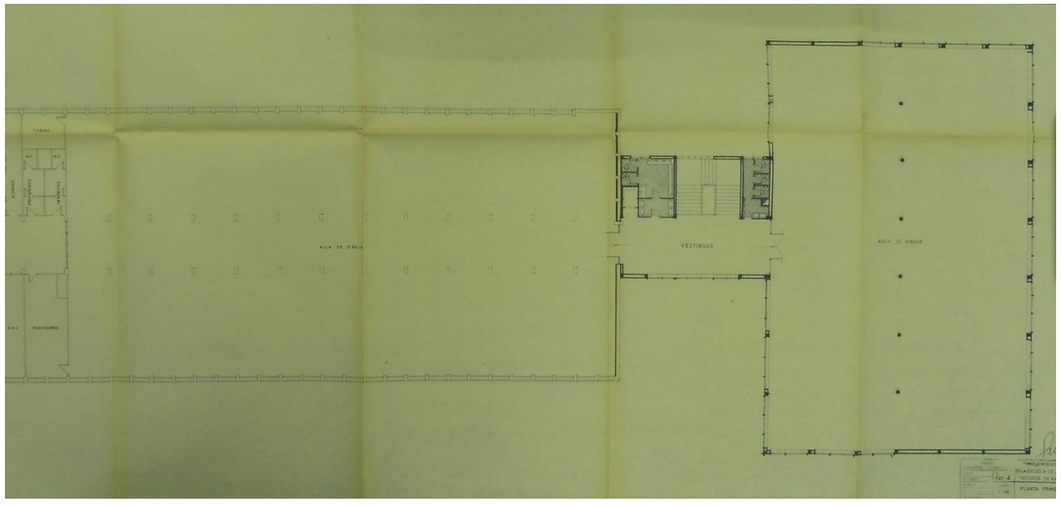
At that time the new university did not have a proper place where to collocate its headquarters. The rector of the EUAT decided to solve both situations, temporally offering part of the new building to establish the rectorate offices in exchange of the completing of the construction works. The provisional solution was accepted and the building completed in 1973.

The new building was made up of five floors: the ground floor, placed at the corresponding height of the basement of the main volume; and four more floors. At the ground floor there would have been an entrance directly facing the public street in order to give the building a second point of access. The architecture was very simple: a single parallelepiped geometry volume with the same window pattern proposed on the three external façades. The lacing between the old and the new building was realized by a parallelepiped narrower volume proposing the same rock coating of the main volume and hosting the vertical connections.

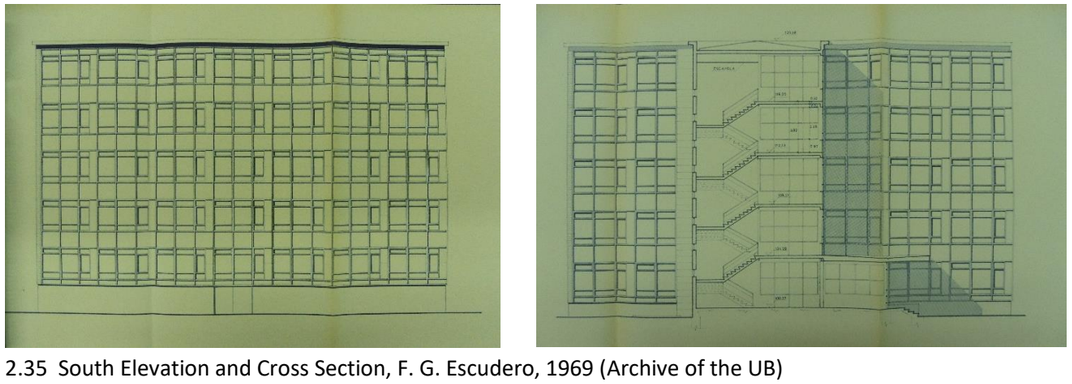
The choice of the architect to realize the structure in steel is reasoned by the intent of limiting the weight of the building and of creating a completely transparent façade with rows of openable windows in order to assure light to the big drawing classrooms and laboratories that mainly occupy the floors. In fact, the need of covering big spans and limiting the beams height led to the employment of steel beams surrounding unidirectional slabs made of clay bricks. However, the vertical closures made of aluminium profiles window fixtures and GLASAL panels show an employment of low-quality materials.



2.33 West Elevation, F. G. Escudero, 1969 (Archive of the UB)



2.34 Fourth floor plan, F. G. Escudero, 1969 (Archive of the UB)



2.35 South Elevation and Cross Section, F. G. Escudero, 1969 (Archive of the UB)

2.3.5 The second extension of the building (1978-1980)

En 1978 the average number of enroled students was about 2.091 but the available spaces were insufficient to satisfy the needs of the new faculty. Not only the number of students had gone up, but the inclusion of the school in a university institution had increased the number and the hours of permanency of professors into the building and also had a positive influence on developing further academic activities. Moreover, three of the five floors beloging to the last extension of the building were still occupied by the rector offices so that some lessons had to be held in the faculty of architecture. For this reason the administration suggested a new extencion of the structure by adding one more floor to the main building.

It was the first time the construction works were financed by the Ministry fund for universities. The project was commissioned to the architect and professor *Jésus Gandullo Guerrero* with the aim of creating new spaces to guarantee the extencion of the library and the creation of new laboratories.

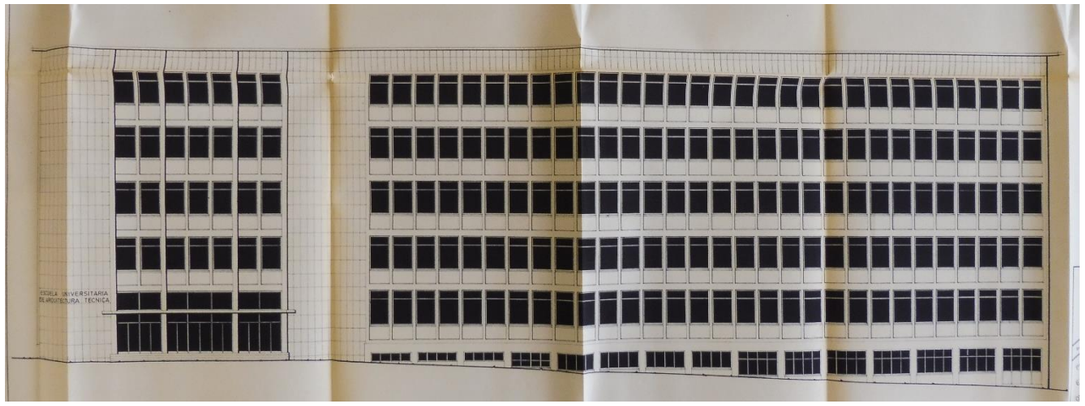
2.36 Photo of the building , 1985

The new floor was mainly destinated to a huge drawing classroom, which occupied about 900 sm, while the rest was destinated to the bar and some offices.

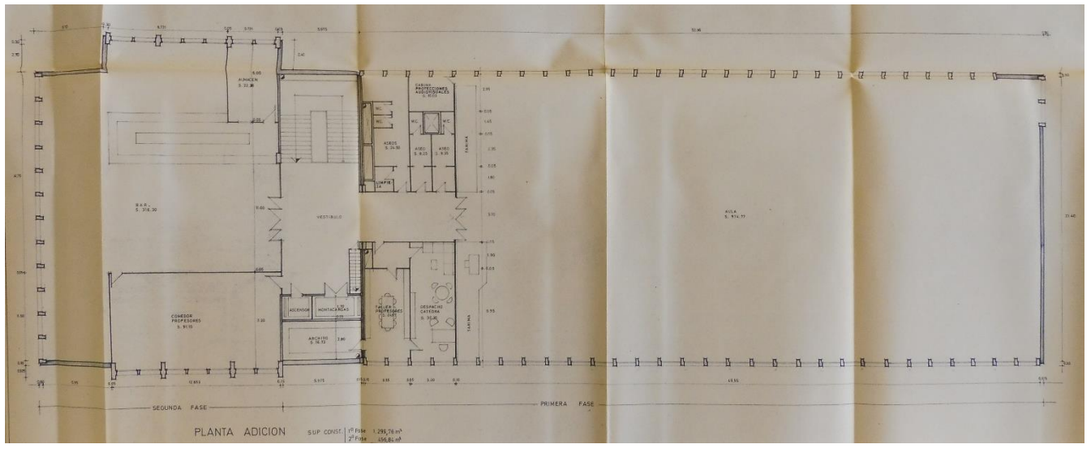
In the preliminary project the original rhythm and composition of the façade were preserved making the new intervention nearly unperceptable. However, the final project kept the rhythm of the windows and the same coating on the vertical closure surfaces, but a jutting balcony was added to enphasize the upper part of the building.
The windows were in aluminium and optically continued the geometrical drawing made by the concrete pillars coming up from downstairs.

With the increasing of the structural weight, the original foundations were strenghthened realizing a perimetric belt of reinforced concrete. The new steel vertical supports were overwhelmed in reinforced concrete pillars, coming up from the floor below and today still surround a metallic roof supported by steel reticular beams. In fact, as the interior spans reached 21 m of lenght, the architect decided to realize a metallic structure in order to avoid the presence of vertical supports at the centre of the classrooms.

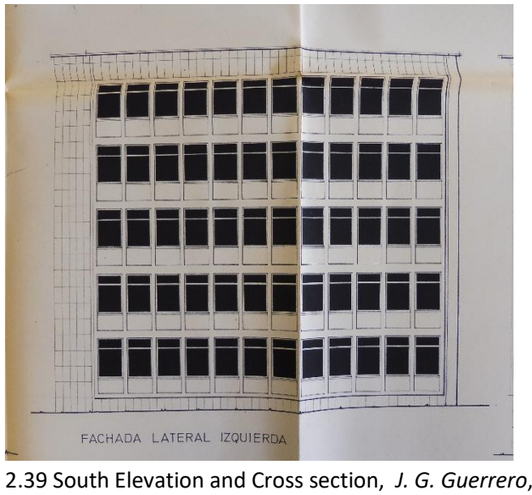
The steel pillars are connected to the aluminium window structure in order to make the vertical closure more stable to horizontal actions. The roof was also made in steel with metallic laminate profiles and on the outside a crown made of different artificial stone remarks the and makes the building's architecture more dynamic.

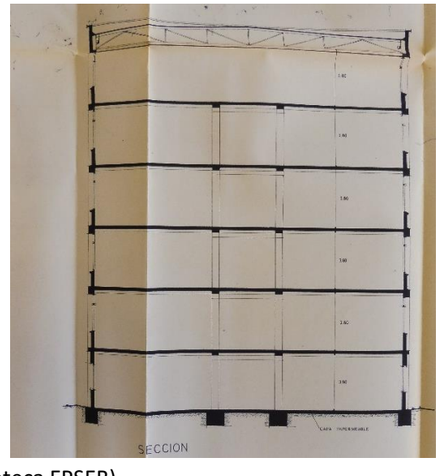


2.37 West Elevation, *J. G. Guerrero*, 1977 (Biblioteca EPSEB)



2.38 Plan of the new floor , *J. G. Guerrero*, 1977 (Biblioteca EPSEB)

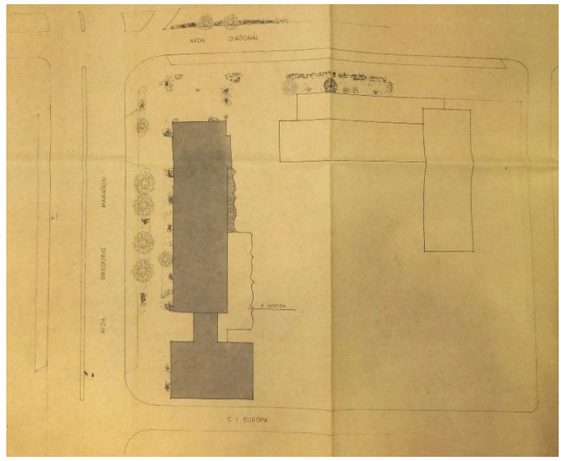




2.39 South Elevation and Cross section, *J. G. Guerrero*, 1977 (Biblioteca EPSEB)

2.3.6 The third extension of the building (1983-1985)

In 1983 a new project was approved in order to realize an annexed building of a total surface of 654 sm, distributed on two levels. The project was designed by the architect *Cesar Gallofré Porrera* along the lines of the extension made by *Josep Antoni Coderch* in the faculty building of Architecture, between 1978 and 1985.
The new volume was built to host classrooms, laboratories and some spaces to carry out workshop activities. It was annexed next to the East façade of the main building and it was connected to it by a longitudinal corridor at the height of the basement in order not to interfere with the circulation of people inside the rest of the building, in particular in the annex where the Rector offices were placed.

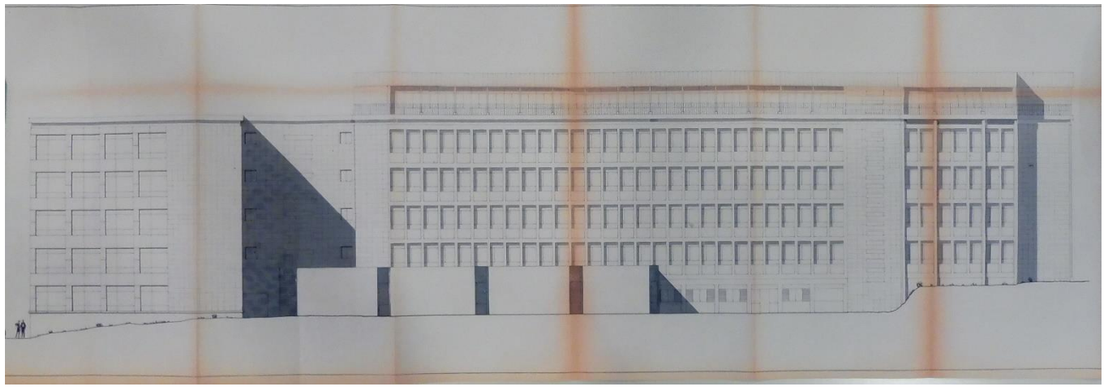


2.40 Layout with the new annex, C. G. Porrera, 1981 (Archive UPC)

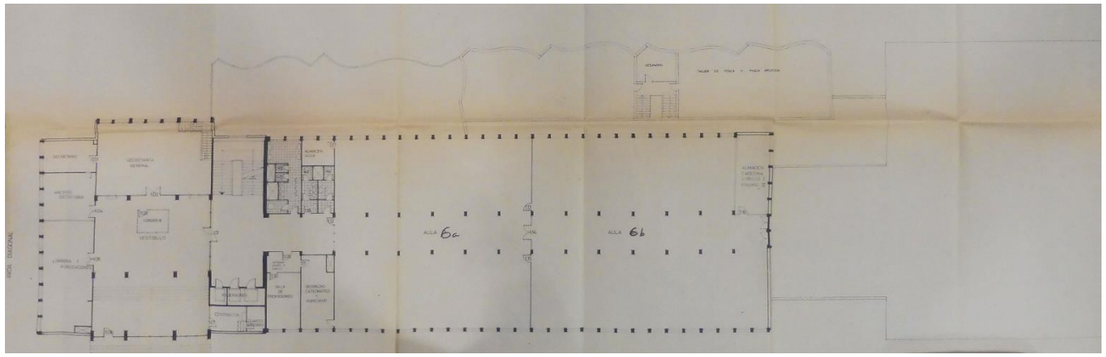
The light entered the corridor from a longitudinal continuous skylight placed on the connecting roof while the rest of the building took some light from narrow vertical windows and punctual small square skylights on the roof.
The external façade of the annex it is characterized by a curvy lined profile alternated by brief straight linear walls where the narrow windows are placed, the curvy part of the elevation was left smooth with no openings. The choice of introducing a curvy façade in a completely squared and rationalist building was probably a way to create an architectural dialogue between the pre-existing buildings and the adjacent faculty building of Architecture which, at that time, had to be extended following *Coderch*'s project. Proposing the same compositive solution, the shared garden between the faculties should have become the fusion point of the two architectures.

The structure is made in reinforced concrete pillars, hiding in perimetral walls of airbricks of 30 cm wide and supporting slabs of prestressed joist and hollow flooring blocks. The corresponding slab in workshop spaces is instead made of a t-beam bridge floor in reinforced concrete with punctual skylights distributed all over the area. The annex also hosts a reinforced concrete stair that connects two staggered floors, one located higher and one lower in relation to the corridor's height.

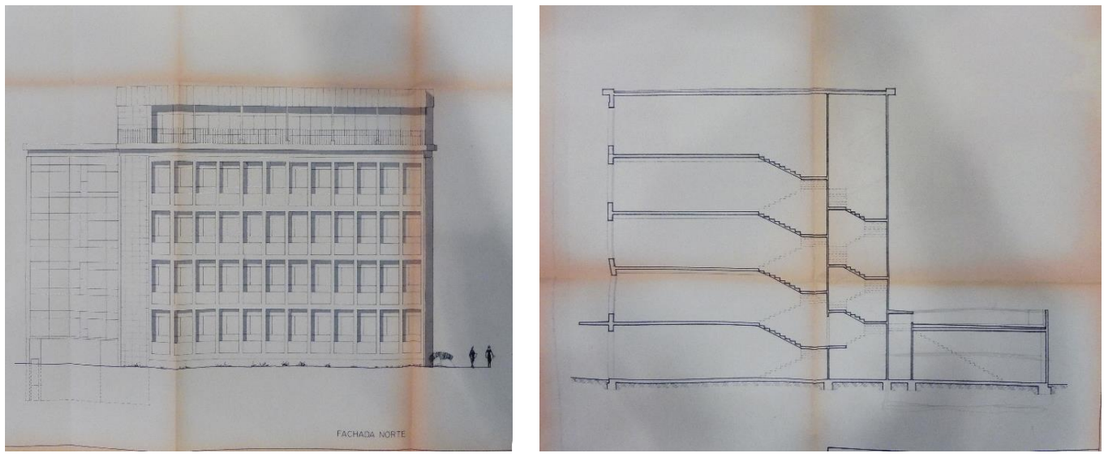
In 1983 the university system was completely reformed and the *Universitat Politecnica de Barcelona (UPB)* changed its name into *Universitat Politecnica de Catalunya (UPC).* The become law gave a positive impulse to the construction of the North Campus in *Pedralbes*, which had remained unrealized since the expropriation of the lands in 1975. Finally, in 1983 the project was approved, and the works slowly began. Between 1996 and 1998, the rectory offices were completely transferred from the second extension block of the faculty to the new buildings of the North Campus: the Torre Girona and the Vertex building.



2.41 East Elevation, C. G. Porrera, 1981 (Archive UPC)



2.42 Second floor plan, C. G. Porrera, 1981 (Archive UPC)



2.43 North Elevation and Cross Section, C. G. Porrera, 1981 (Archive UPC)

After 25 years all the surfaces were finally available, so, that the administration of the faculty decide to approve a rehabilitation project for the complex. Between 1999 and 2000, the old library was doubled in the surface and repositioned in another side of the building; a theatre and a dissertation room were realized, while the administration offices were made from the new.

3 ANALYSIS OF THE BUILDING

3.1 CURRENT STATE

3.1.1 Introduction

The analysis of the building consists in the collection of all information, regarding the current state of the building from an architectural, structural and energy point of view. The aim of the study is to achieve a complete consciousness of the building's architectural value, constructive system and energy behaviour, in order to develop a project solution that can answer, at the same time, to the aesthetical, technological and sustainable needs of the building. The method used to collect the data is the result of archive and bibliographic researches besides personal observations and measurements made on site.

3.1.2 General description

3.1 Layout plan of the building, 2019 (ICGC)

City: Barcelona

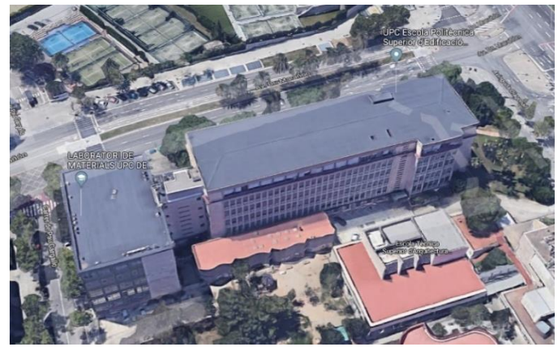
District: Les Corts

Neighbourhood: La Maternitat i Sant Ramon

Address: Avenida Doctor Marañón, 44-50

Footprint built surface: 3.255 s

The EPSEB building is situated along the *Avenida Doctor Marañon*, in the neighbourhood of *La Maternitat i Sant Ramon*. Precisely, the block is, boarded by the *Avenida Digonal* on the North side; *Avenida Doctor Marañon* on the western part; *Carrer de Pau Gargallo* on the South and *Carrer d'Adolf Florensa* on the East. Since it is one of the most important axis crossing the city from one side to another, the *Diagonal* is an expressway road connecting the inland with the sea. The *Avenida Doctor Marañon*, instead, is among the main arteries of the neighbourhood and it intersects the Diagonal arriving directly to the *Camp Nou* stadium. The other two streets are secondary roads, but in particular *Carrer of Florensa* is only opened to tramway traffic. The building occupies the western side of the block and it shares the rest of the area with the complex of the *Escola Tècnica Superior de Arquitectura de Barcelona (ETSAB)*. The general morphologic conformation of the ground in this point is not plan, it slopes down from the *Diagonal* until *Carrer de Pau Gargallo,* reaching a height difference between the two parts of 5.30 m. The building is oriented almost following the North-South direction and takes advantage of this level difference by having two accesses placed both on the western side, but on different levels. To analyse the entire building it is easier to distinguish the structure in three different blocks:

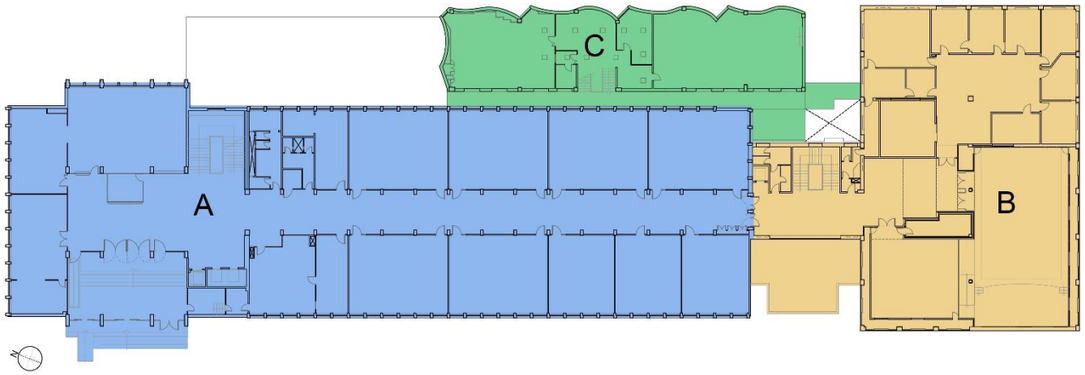


3.2 Top view of the building, 2018 (Google)

- BLOCK A: the main and oldest one which has a parallelepiped shape;
- BLOCK B: ortogonal to the main one and built in a second time;
- BLOCK C: the smaller more recent unit, disposed parallely to the main one.

3.3 East elevation

3.4 West elevation



3.5 Plan sample

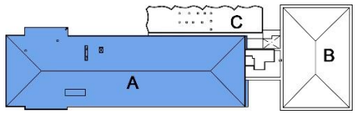
BLOCK A

DIMENSIONS:

L 78,5 x W 21,9 m

NUMBER OF FLOORS:

Basement + Ground floor + 4 more floors



3.6 North-West view of the main unit, 2019 (Own creation)

The main block has a cross shaped plan with two barely protruding crossed arms. The access to the building takes place through the west side wing, marked by an external stairway and a glassed reinforced concrete porch roof and surrounded by 4 pillars running from the bottom to the top of the façade.

The structure is made of reinforced concrete pillars and beams supporting vertical and horizontal closures. The slabs are mixed, made of hollow flooring blocks and unidirectional reinforced concrete joists. The scheme of the pillars changes depending on their position in the plan. In the longitudinal unit the pillars are distributed simmetrically along the central corridor with a spacing distance of 3.50 m. In the transversal unit, the section of the pillars is bigger and the spacing distance between them reaches a maximum of 5,30 m.
Along the entire perimetre of the building, the number of pillars is doubled, proportionally supporting half of the weight of the main span. These pillars stop at the height of the main beam supporting the ground floor, without arriving until the foundation level. This perimetral disposition of the supports is the element that gives rhythm to all the façades, permitting to follow a fixed module on each side and making all elevations look alike.

The last floor, added in 1980, has a different structure from the rest of the block. The pillars are made in steel profiles with a 'H' cross section and are drawned in the downfloor reinforced concrete pillars. These supports remain external from the façade's continuous profile and are connected to it by horizontal steel elements. The covering structure is made of connected steel trusses and horizontal wind bracers, placed at regular distances. The original covering in metalic sheets was later finished with an addition of sandwich panels and a waterproofing top.

In the façade we can find two different kind of vertical closures. Under the windows, the opaque closure consists of a double wall with an inbetween still air layer, coated by plaster on the inside and by a layer of plaster and metallic profiles as an exterior finish. The fully blind wall instead, are made of the same interior elements, but are finished with a light coloured natural limestone covering.

The original aluminium windows were substituted in 2010 by new metallic windows frames with insulated glazing to guarantee a better energy efficiency behaviour. The windows at the 4th floor make an exception and still have a single glass with an aluminium frame.

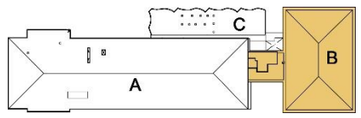
BLOCK B

DIMENSIONS:

L 34,0 x W 23,3 m

NUMBER OF FLOORS:

Ground floor and mezzanines + 4 more floors



3.7 South-East view of the second unit, 2019 (Own creation)

The second block has a T shaped plan and it's made up of 2 orthogonal parallelepiped elements. The smaller one is the connecting building between the main blocks, hosting all vertical connections between the floors. The access to this building is situated on its West side, even if, currently, only the main entrance is used to enter the faculty.

The bigger block has a steel structure of pillars and beams. The slabs are made of hollow flooring blocks and unidirectional reinforced concrete joists. The distribution of the pillars is regular with a maximum spacing distance between the elements of 11,5 m.

The covering is supported by connected steel trusses and horizontal wind bracers. The original covering in metalic sheets was later finished with a waterproofing biouminous top.

The façades are all similar and characterized by an aboundance of openings to take advantage of the natural light. Most part of the vertical closures are made of an alluminium structured courtain wall system with green coloured GLASAL exterior panels and single layered glass windows. Only in correspondence of the basement the wall is made of bricks and covered with an exterior cement fair faced finishing. The fully blind walls, instead, are probably made of two layers of air blocks with air inbetween and are finished with a light coloured artificial limestone covering.

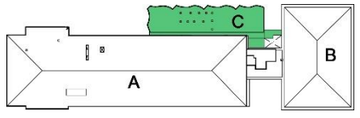
BLOCK C

<u>DIMENSIONS:</u>

L 38,5 x W 9,0 m

<u>NUMBER OF FLOORS:</u>

2 floors



3.8 East view of the third unit, 2019 (Own creation)

This is the most recent and smallest block of the faculty. The volume is like a parallelepiped but with one side of the perimeter characterized by curved walls. The access to this block happens from the East façade, in correspondence with a longitudinal corridor, running parallel to this annex and connecting it with the main building.

The structure is made up of pillars and a reticular slab in reinforced concrete. The use of this kind of horizontal closure permits the opening of small square skylights in the roof.

The vertical closures are made with hollow blocks, following the external curved profile, and are exteriorly finished with a layer of fair faced cement.

The windows are in line with the internal side of the walls. the window frame in aluminium and supports a single layer glass window.

3.1.3 Relation with the neighbouring buildings

The EPSEB building shares the block where it is placed with the *Escuela Tècnica Superior de Arquitectura de Barcelona (ETSAB)* and the *Biblioteca Oriol Bohigas.*

3.9 Top view of the block and its buildings,2018 (J. Arxiuaeri M.)

As we already said in the preliminary historical evolution of the South Campus, the EPSEB and ETSAB first buildings were designed by the same architects. At the beginning, the faculty of architecture was made up of two main blocks intersecting each other in a shape of an 'L'. The block disposed orthogonally to the Diagonal was the tallest of the two and, today, with its 8 floors over the ground, it is still among the outstanding buildings of the South Campus. Since the original building was designed by the same architects of the EPSEB, the historical façade and plans have many points in common.

The project plans, dated back to 1954, show that the disposition of the pillars follows the same scheme of our building: the number of the central pillars is half of the perimetral ones and these last give rhythm to the openings of the façades, overhanging in comparison to the rest of the surfaces and creating a framework shadow over the windows. Another common feature is the kind of applied external coating made of light-coloured natural limestone that cover all the vertical closed surfaces. The last floor is treated in a different way if compared to the other one, it was designed as a crowning with a very light railing running all along the perimeter while the reinforced concrete pillars coming from the below are replaced with an inwards steel structure.

As we can see many analogies create an architectonical relationship between the buildings, probably because, at that time, the idea was to give birth not just to single independent blocks, but to create a unified university complex which had to be recognizable to everyone from the outside.

By 1985, both faculties had already been extended by different architects*: Coderch* designed the project for the faculty of Architecture while the annex for the faculty of Architectural Technology was commissioned to *Gallofré*.

The new annexed structures are characterized by a curvy profile towards the garden, completely in contrast with the previous strictly squared units. A hypothesis could be that the aim of the architects was to create a dialogue between the buildings since they share the garden, placed at the centre of the block. Unfortunately, the result of the composition does not look so harmonic and unified.

3.10 View of the West façade of the ETSAB, 2019 (Own creation)

3.11 East façade of the EPSEB,2019 (Own creation)

As we can notice from the pictures, while the new block designed by *Coderch* is in contrast but at the same time blended with the pre-existing structure, in the case of the EPSEB complex the new annex seems out of place. Also, while in the building of architecture the inside spaces are visually connected to the garden by a series of linear cuts that interrupt the curvy profile where huge windows were placed, the addition designed by *Gallofré* remains closed and isolated from the garden. Even if the curvy profile is quite similar, in this case, the windows are small and aligned with the interior walls; the rest of the façade is totally smooth with no other openings.

In 2009, the ETSAB approved a further extention of the faculty realizing a new building between the two pre-existing ones in order to host the new library. The structure has 2 floors (basement and ground floor) and it is parallelepiped volume characterized by a curtain wall windows and an envelope of light coloured stone.

The new unit is placed on the north side of the block and, while it is tightly connected to the belonging faculty with more than one access point, it does not present any type of comunication with the EPSEB building. Still, the presence of wide windows towards the central shared garden makes it possible to create a point of contact with the adjacent block.

3.12 ETSAB Coderch annex, 2019

3.13 EPSEB Gallofré annex, 2019 (Own creation)

3.14 Biblioteca Oriol Bohigas, 2019 (Own creation)

3.1.4 Functional analysis

University buildings are usually characterized by the contemporary presence of a wide-ranged intended uses. A functional analysis is necessary to classify spaces in order to understand the user needs and eventually to relocate the rooms according to optimization and comfort criteria.

In our case spaces can be classified by two main categories:

- ROTATING USE SPACES, referring to all those spaces that are used in turns during the day both by students o professors. Classrooms, laboratories, libraries, dining rooms, study and relaxing areas belong to this category.
- FIXED USERS SPACES, referring to all those spaces that are usually used by the same people each day. Offices, administration spaces, departments belong to this category.

Usually, to ease users in the use of university buildings, areas belonging to the first category are placed on the first floors while, spaces destinated to fixed users, since they don't require great movements during the day, are placed on the upper floors.

Inside these two categories we can distinguish the following functional cores:

- SPACES FOR DIDACTIC ACTIVITIES: classrooms, laboratories, workshop areas;
- SPACES FOR STUDYING: library, studying rooms;
- ADMINISTRATION: secretary, professors offices, departments, meeting rooms;
- SPACES RESERVED TO STUDENTS: student's associations;
- SPACES RESERVED TO PROFESSORS: relaxing area, dining rooms;
- FACILITIES: bathrooms, dressing rooms;
- DISTRIBUTION AREAS: corridors, stairs, lifts, entrance halls;
- SERVING AREAS: archives, installations, storage areas;
- COMMON AREAS: relaxing areas, dining rooms, theatre.

Follows the functional analysis of each floor of the building with the count of the partial and total square meters (See Annex 4).

3.1.5 Identified problems

When developing a rehabilitation project for people who are the everyday users of a building, I believe that the first ones who can help the designer to identify which are the most important lacks and needs, in terms of facilities, are the users themselves. For this reason, it seemed to me necessary to interview some of the students and professors to ask them what they would change about the current organization and management of the spaces.

Here is a brief list of lacks, problems and wishes I personally noticed, together with the answers I collected from my interviews:

- LACKS: studying rooms; relaxing areas; external space for workshops and laboratory research; electric sockets in the library and classrooms.
- PROBLEMS: impossibility to open/close the shutters autonomously; high heating during the winter; inadequate furnishing in the classrooms/library; too much sun bothering in the classrooms situated on the West side of the building; humidity in block B and in the basement walls; too little students around and in the classrooms; extend the opening hours of the canteen.
- WHISHES: canteen with fresh-made food; internal bike parking area; outside common area; no direct access to the laboratories of the basement.

4 CONCLUSIONS

4.1 FURTHER NEEDED ANALYSIS

The analysis illustrated up until this point has a general character and underlines the historical and cultural values that the building witnesses itself, especially in relation with the surrounding environment. Still, the collected information is not enough to develop a project intervention.

The following necessary step to make is a detailed survey of the building, in order to produce a correct graphic representation of plans, sections and structures, besides all the architectonical points of junction between the elements. This procedure is important to understand the structural behaviour of the building and adopt a compatible layout plan solution.

A further needed study concerns a statistic analysis of the number of students, professors and administrative staff currently using the building, together with the classroom's timetables. These data will guide both the architectonic refurbishment and the energy efficiency rehabilitation. In the first case, these data are useful to detect the unused spaces and will help to optimize the redistribution of the spaces. In the second case they will help to plan a rational management of all energy systems, in order to limit energy wasting.

The last, but not less important analysis, is the detection of toxic materials in the building. From the general study regarding the vertical closures, we can notice the presence of the GLASAL system in the

coating of block B. This system had many applications, especially in the 70's, when it was generally used to close office building façades. This material has later been recognized as toxic for humans since it has been classified among the asbestos-containing materials. This study will help to decide how to correctly intervene on the envelope of this block.

4.2 PROJECT GUIDELINES

From the analysis carried out up until now, I noticed that most of the problems that affect negatively the students' opinion concerning the faculty building, are mainly connected to a bad management or lack of facilities. The lack of spaces dedicated to students discourages an active participation to the academic life, causing a general individualistic environment.

The aim of the project is to create new common areas to let the students enjoy studying, breaks and spare time between the lessons, in order to encourage the sharing and stimulating environment. In the new plan asset, it would be necessary to include an external area, such as a green roof or a terrace, and reorganize the inside disposition of the library.

Moreover, from the historical study comes to light the necessity to keep the exterior appearance of the main building façades, more or less as they are, since they witness an important phase of architecture history. On the other hand, the artistic and architectonic value of the other volume (Block B), is not that important and, since the humidity problems and toxic risks are both concentred in this structure, it would be useful to rethink the entire envelope from an architectural and energy efficiency point of view.

For what concerns the smaller annexed building (block C), the intervention should aim at opening the inside spaces to the garden and integrate the façade with the rest of the building, finding a common architectonic language.

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- **Picture 2.8:** https://www.pinterest.com/pin/756534437376757072/
- **Picture 2.9:** https://www.skyscrapercity.com/showthread.php?t=511681&page=49
- **Picture 2.10:** Own creation based on images from https://www.google.com/maps/@40.0349583,-3.713484,6z ; http://www.icc.cat/appdownloads/?c=fmetopo5m
- **Pictures 2.11; 2.12:** Own creation
- **Picture 2.13:** Own creation based on images from http://www.icc.cat/appdownloads/?c=fmetopo5m
- **Picture 2.14:** Own creation based on images from https://www.google.com/maps/@40.0349583,-3.713484,6z
- **Picture 2.15:** LLUÍS BOU I ROURA, *La Maternitat i Sant Ramon: Desenvolupament urbà d'un barri de les Corts*. Ajuntament de Barcelona, p. 78. Districte de les Corts i Arxiu Municipal, 2009. ISBN 978-84-9850-149-0
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- **Picture 2.18:** Archivo Histórico de la Universidad de Barcelona. *''Escoles Tècniques Superiors d'Enginyers, Aparelladors i Arquitectes. Menjadors Universitaris. Pressupost exercici 1962''*, 1952-1970
- **Picture 2.19:** https://1.bp.blogspot.com/-Cp-nFwIioxU/UmDc9kqbWdI/AAAAAAAAhXw/9aLcqbzBgK4/s1600/DiAGONAL.Z.UNIVERSITARIA.1960.jpg
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- **Picture 2.23:** https://upcommons.upc.edu/bitstream/handle/2117/123166/P8052464.jpg?sequence=1&isAllowed=y
- Pictures **2.24; 2.25; 2.26:** Archivo Histórico de la Universidad de Barcelona. *''Sector tècnico-artístic; Plànols del projecte d'Esc. Sup. d'Arquitectura i ensenyament d'Aparelladors''*, 1955
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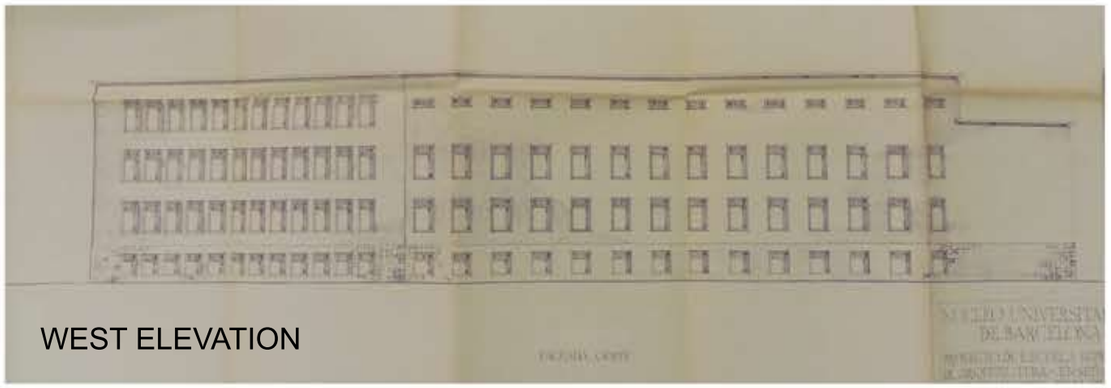
- **Picture 2.29:** Arxiu de la Universitat Politècnica de Catalunya. Escola Politècnica Superior d'Edificació de Barcelona. " Plànols i croquis de l'EPSEB (Sr. Bona)", 1960
- **Picture 2.30:** Biblioteca EPSEB. **''**Projectes d'ampliació i remodelació de l'edifici de l'Escola Politècnica Superior d'Edificació de Barcelona'' (1972-1981)

- **Picture 2.31:** Arxiu de la Universitat Politècnica de Catalunya. Escola Politècnica Superior d'Edificació de Barcelona. " Plànols i croquis de l'EPSEB (Sr. Bona)", 1960
- **Pictures 2.32; 2.33; 2.34; 2.35:** Archivo Histórico de la Universidad de Barcelona. ‘’*Projectes escoles d'Arquitectes Tècnics i Enginyers*, 1966-1969
- **Pictures 2.36:** FRANCESC X. PUIG ROVIRA, *Dels estudis d'Aparellador a l'Escola Politècnica Superior d'Edificació de Barcelona*, p.133. Barcelona: Escola Politècnica Superior d'Edificació de Barcelona, 2012. ISBN 13-978-84-7653-907-1
- **Pictures 2.37; 2.38; 2.39:** Biblioteca EPSEB. **‘’**Projectes d'ampliació i remodelació de l'edifici de l'Escola Politècnica Superior d'Edificació de Barcelona’’ (1972-1981)
- **Pictures 2.40; 2.41; 2.42, 2.43:** Arxiu de la Universitat Politècnica de Catalunya. Escola Politècnica Superior d'Edificació de Barcelona. ‘’Plànols de l'EPSEB (Arquitecte: Cèsar Gallofré Porrera)’’, 1981
- **Picture 3.1:** http://www.icgc.cat/
- **Picture 3.2:** https://www.google.es/maps/@40.2085,-3.713,6z?hl=it
- **Pictures 3.3; 3.4; 3.5; 3.6; 3.7;3.8:** Own creation
- **Picture 3.9:** https://upcommons.upc.edu/handle/2117/130156
- **Picture 3.10; 3.11:** Own creation
- **Picture 3.12:** https://scontent-frt3-1.cdninstagram.com/vp/bdd62f2dd5bc51ad83c6db76cc05295d/5D9876C1/t51.2885-15/e35/60809092_641259329620075_7547998886492274280_n.jpg?_nc_ht=scontent-frt3-1.cdninstagram.com
- **Picture 3.13; 3.14:** Own creation

ANNEX 1

ARCHIVE DOCUMENTS

PRELIMINARY PROJECT (1955-1956) - ARCHITECTS: Eusebi Bona Puig; Pelayo Martínez Paricio; Josep Maria Segarra i Solsona



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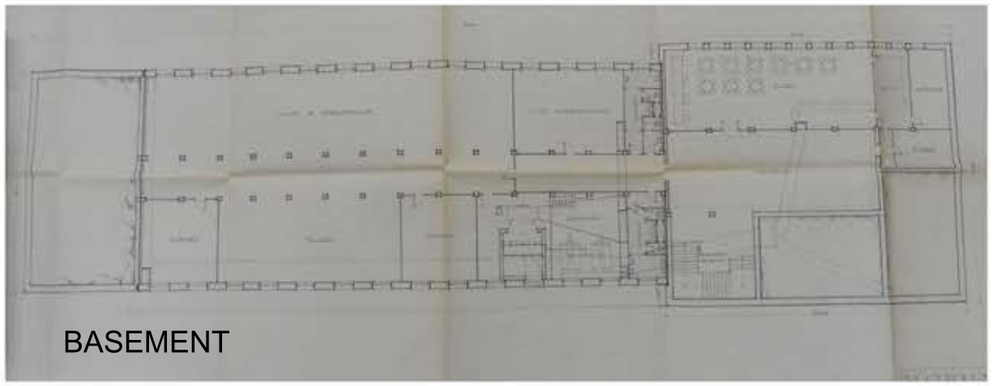

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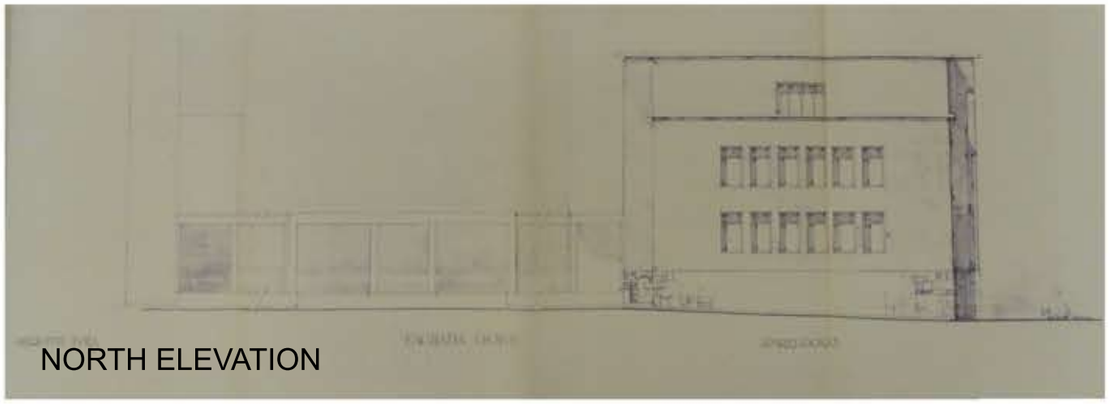

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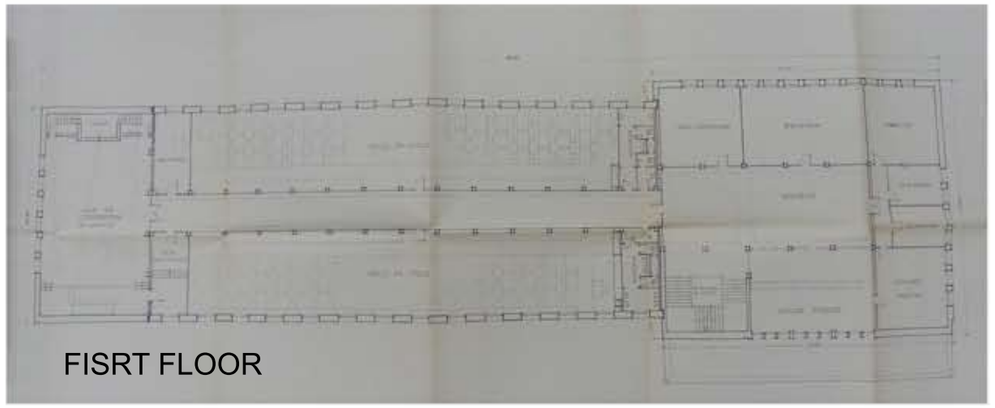

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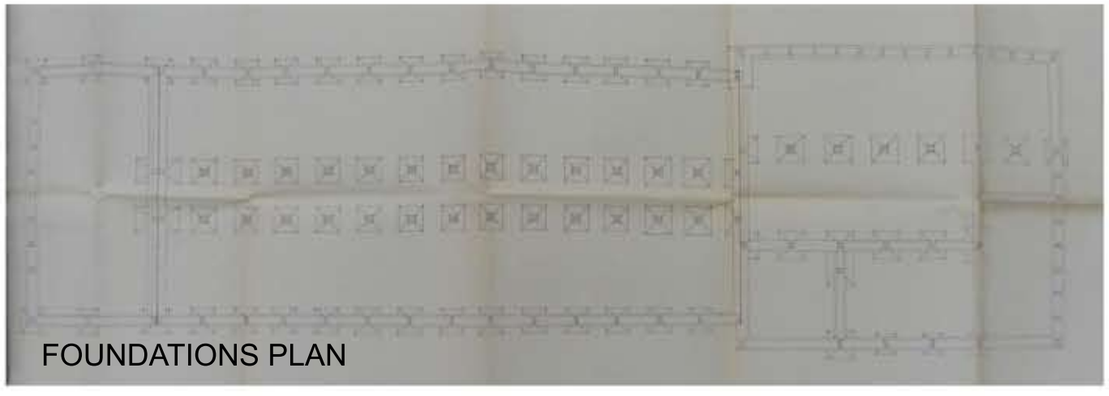

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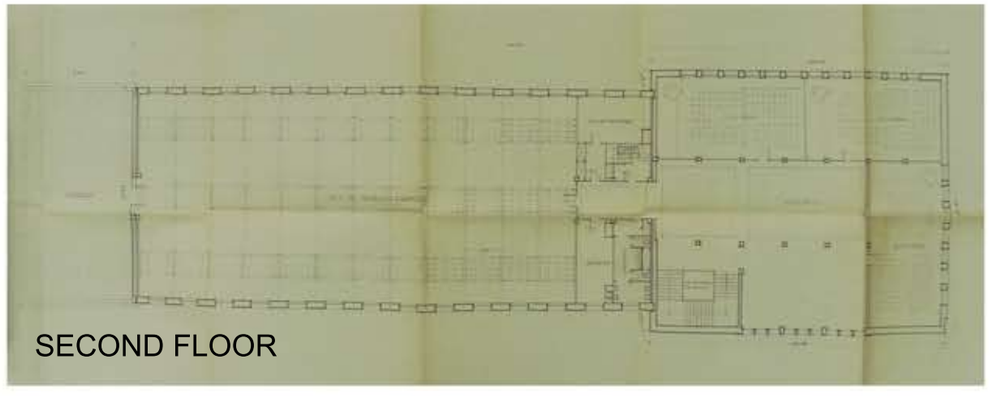
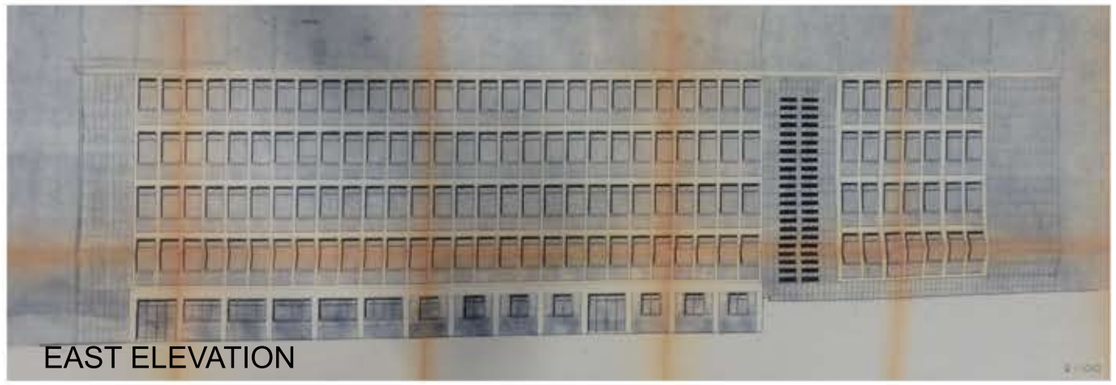


SECOND FLOOR

Pictures source: Archivo Histórico de la Universidad de Barcelona. ''Sector tècnico-artístic; Plànols del projecte d'Esc. Sup. d'Arquitectura i ensenyament d'Aparelladors'', 1955

Escola Politècnica Superior d'Edificació de Barcelona UNIVERSITAT POLITÈCNICA DE CATALUNYA	REHABILITATION PROJECT OF THE EPSEB FACULTY BUILDING	SCALE:
STUDENT: Elisa Petrucci SUPERVISOR: Montserrat Bosch Gonzales	TITLE: Evolution of the building - Archive research	ANNEX: 1.1

FINAL PROJECT (1958-1961) - ARCHITECTS: Eusebi Bona Puig; Pelayo Martínez Paricio; Josep Maria Segarra i Solsona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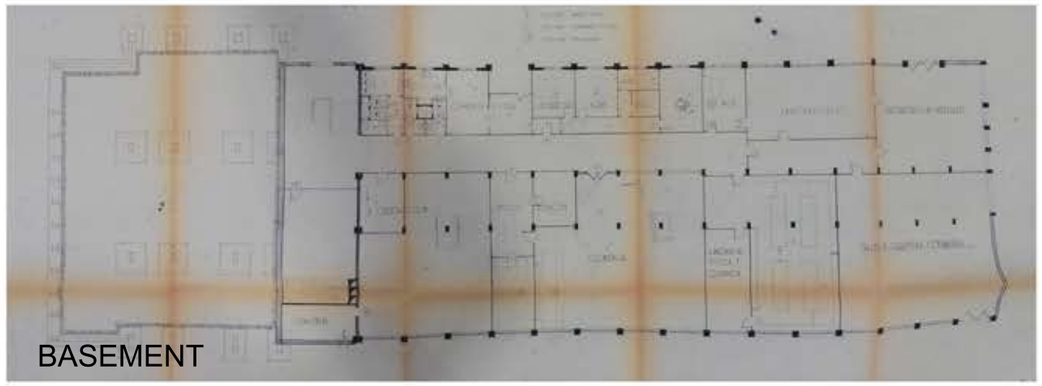
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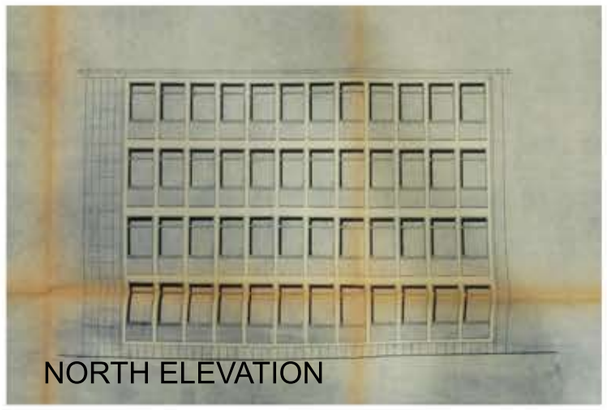
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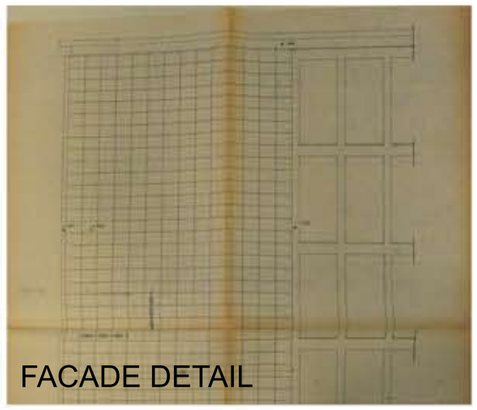
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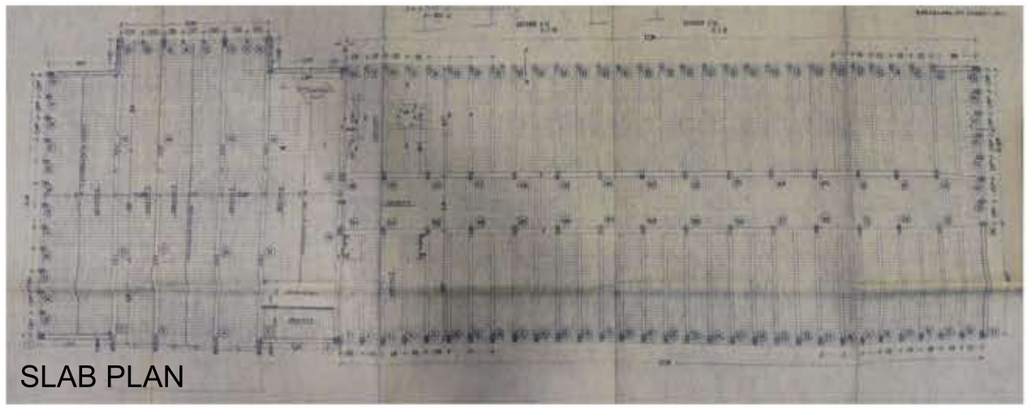
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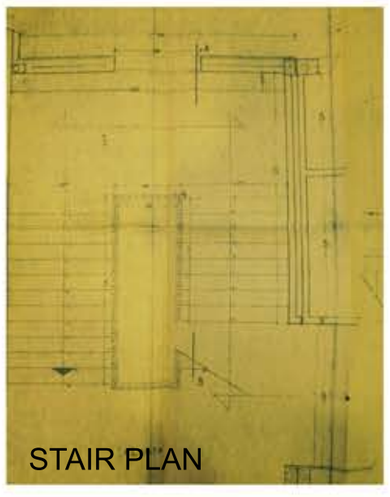
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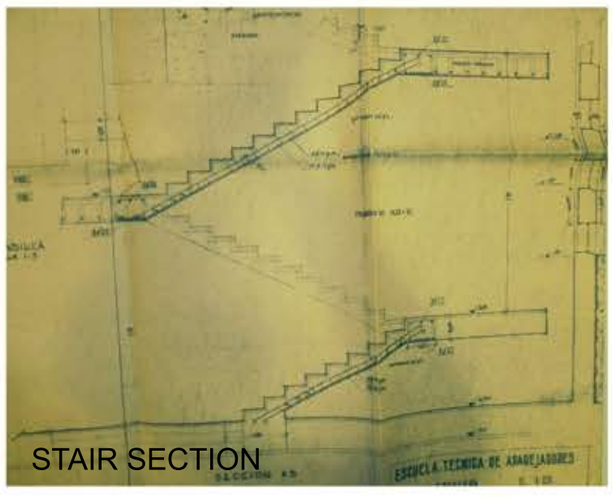
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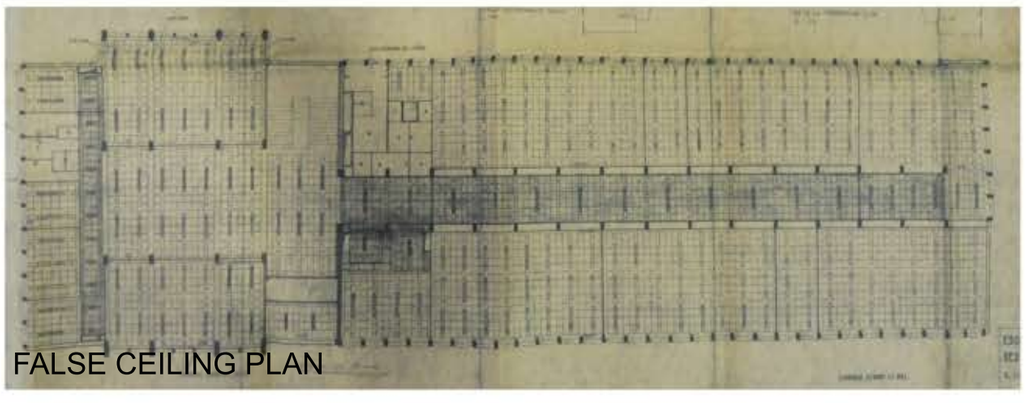

FALSE CEILING PLAN

Pictures source: Arxiu de la Universitat Politècnica de Catalunya. Escola Politècnica Superior d'Edificació de Barcelona. " Plànols i croquis de l'EPSEB (Sr. Bona)", 1960

Escola Politècnica Superior d'Edificació de Barcelona
UNIVERSITAT POLITÈCNICA DE CATALUNYA

REHABILITATION PROJECT OF THE EPSEB FACULTY BUILDING

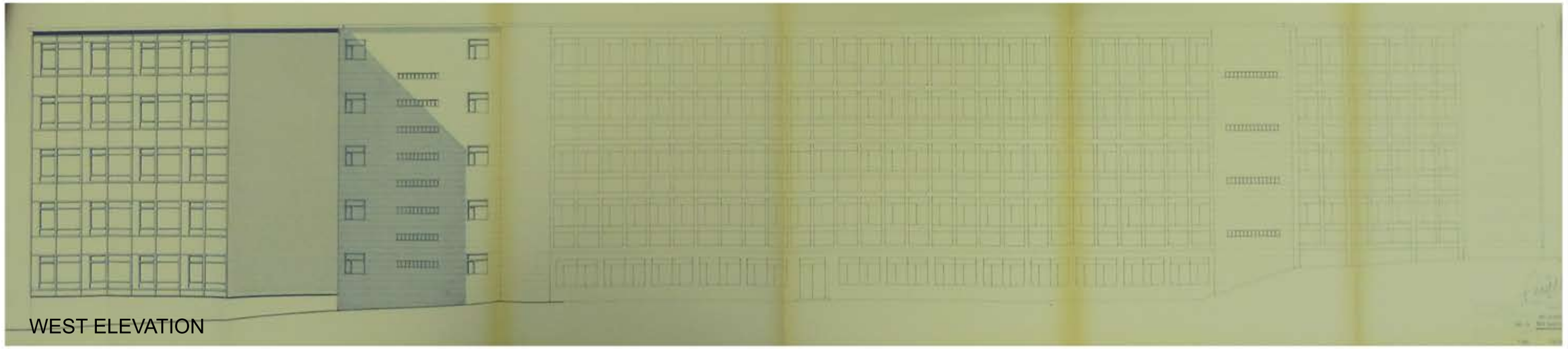
SCALE:

STUDENT: Elisa Petrucci
SUPERVISOR: Montserrat Bosch Gonzales

TITLE:
Evolution of the building - Archive research

ANNEX:
1.2

FIRST EXTENSION (1996-1973) - ARCHITECT: Felipe García Escudero



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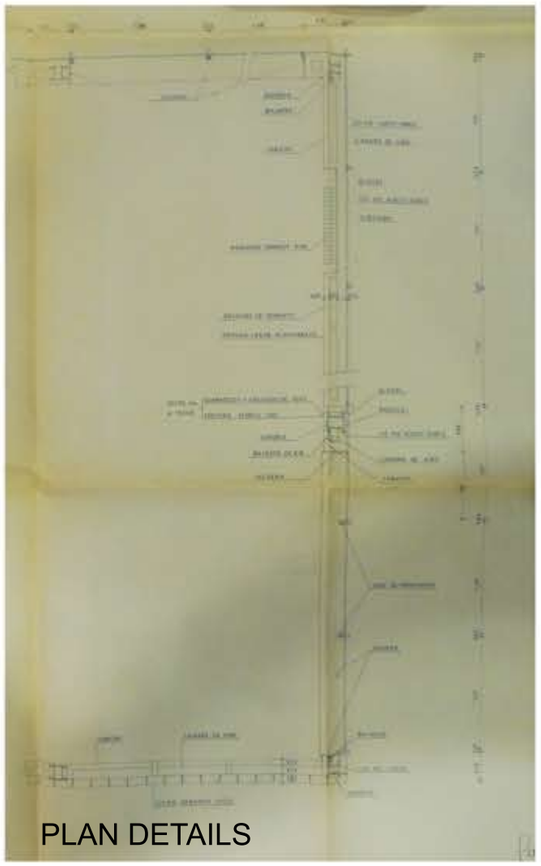
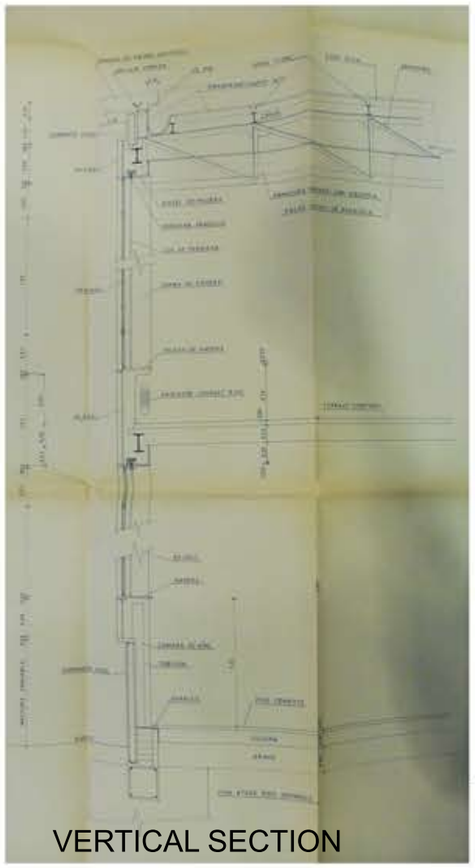
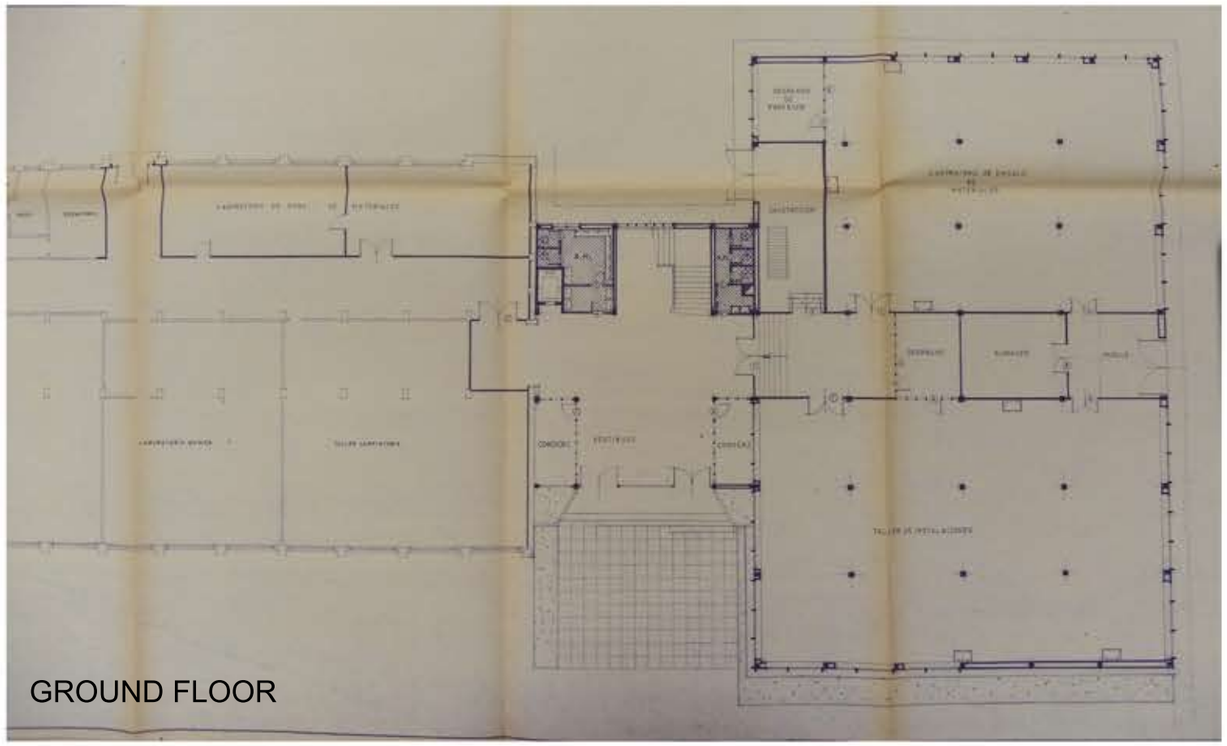


PLAN DETAILS



VERTICAL SECTION

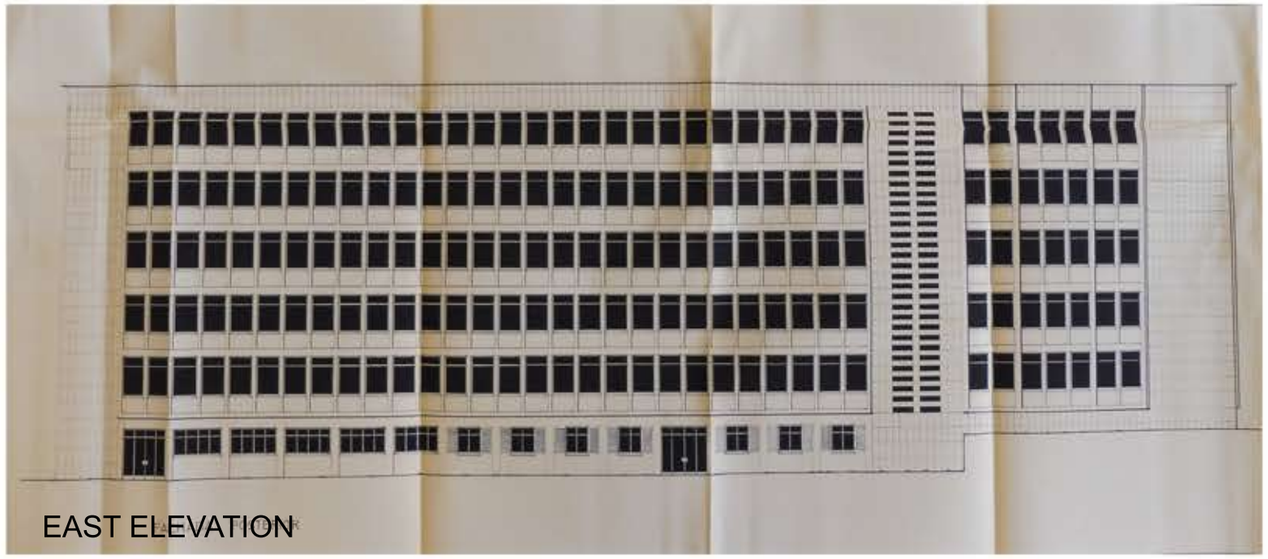


GROUND FLOOR

Pictures source: Archivo Histórico de la Universidad de Barcelona. '' Projectes escoles d'Arquitectes Tècnics i Enginyers, 1966-1969

Escola Politècnica Superior d'Edificació de Barcelona UNIVERSITAT POLITÈCNICA DE CATALUNYA	REHABILITATION PROJECT OF THE EPSEB FACULTY BUILDING	SCALE:
STUDENT: Elisa Petrucci SUPERVISOR: Montserrat Bosch Gonzales	TITLE: Evolution of the building - Archive research	ANNEX: 1.3

SECOND EXTENSION (1978-1980) - ARCHITECT: Jésus Gandullo Guerrero



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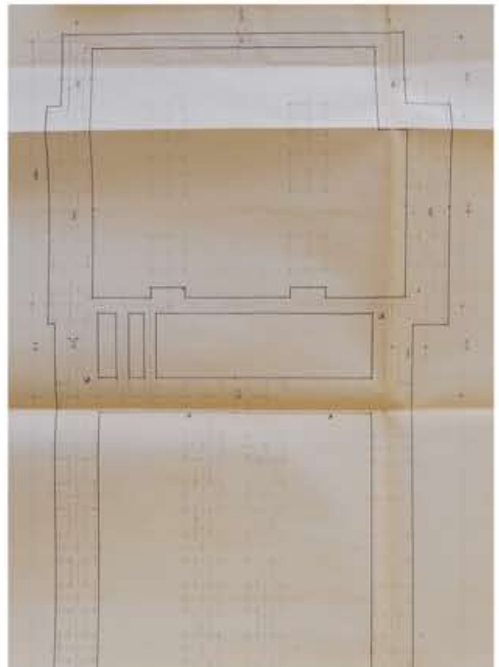
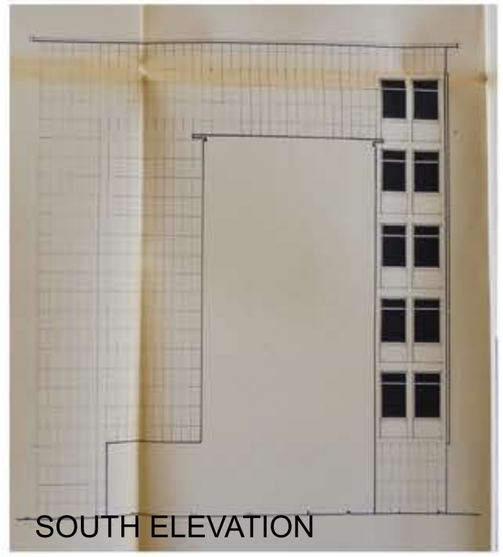


FOUNDATION PLAN



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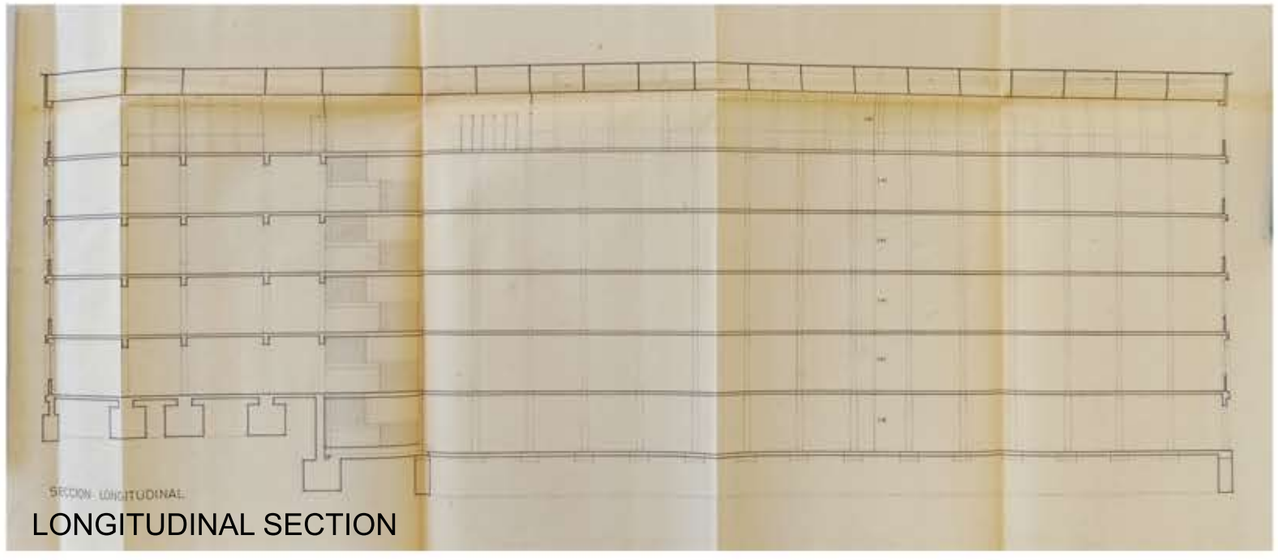

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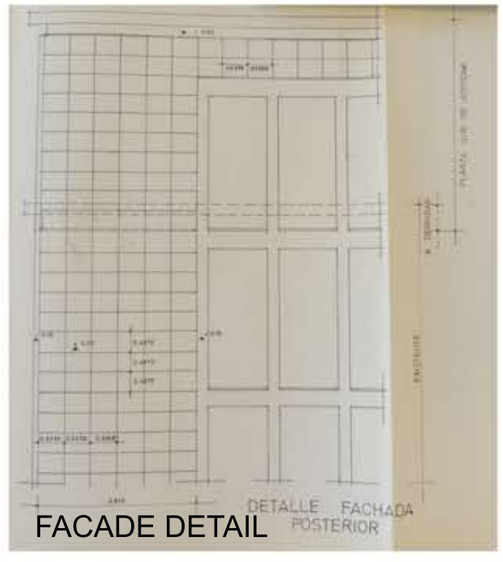
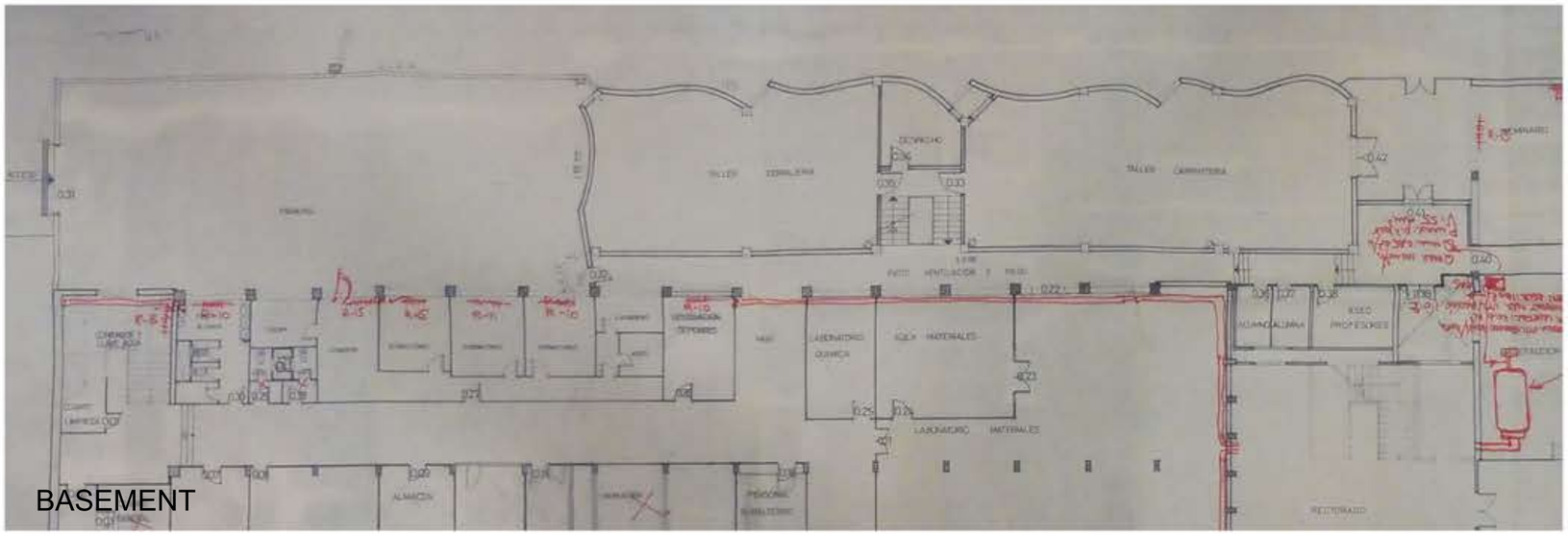


FACADE DETAIL

Pictures source: Biblioteca EPSEB. ''Projectes d'ampliació i remodelació de l'edifici de l'Escola Politècnica Superior d'Edificació de Barcelona'' (1972-1981)

Escola Politècnica Superior d'Edificació de Barcelona UNIVERSITAT POLITÈCNICA DE CATALUNYA	REHABILITATION PROJECT OF THE EPSEB FACULTY BUILDING	SCALE:
STUDENT: Elisa Petrucci SUPERVISOR: Montserrat Bosch Gonzales	TITLE: Evolution of the building - Archive research	ANNEX: 1.4

THIRD EXTENSION (1981-1985) - ARCHITECT: Cesar Gallofré Porrera



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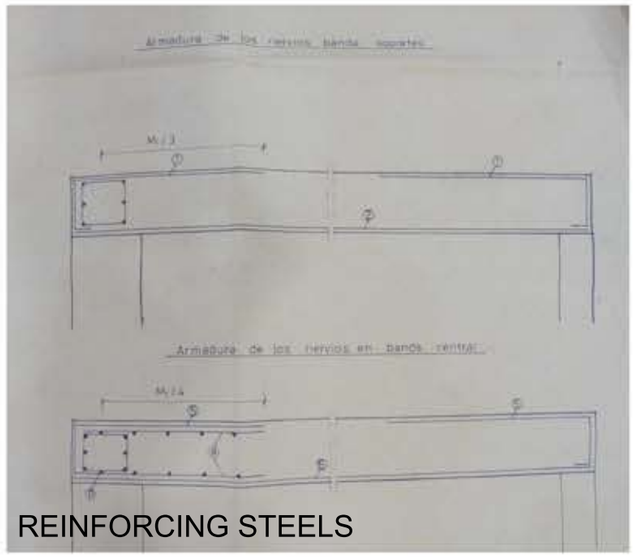

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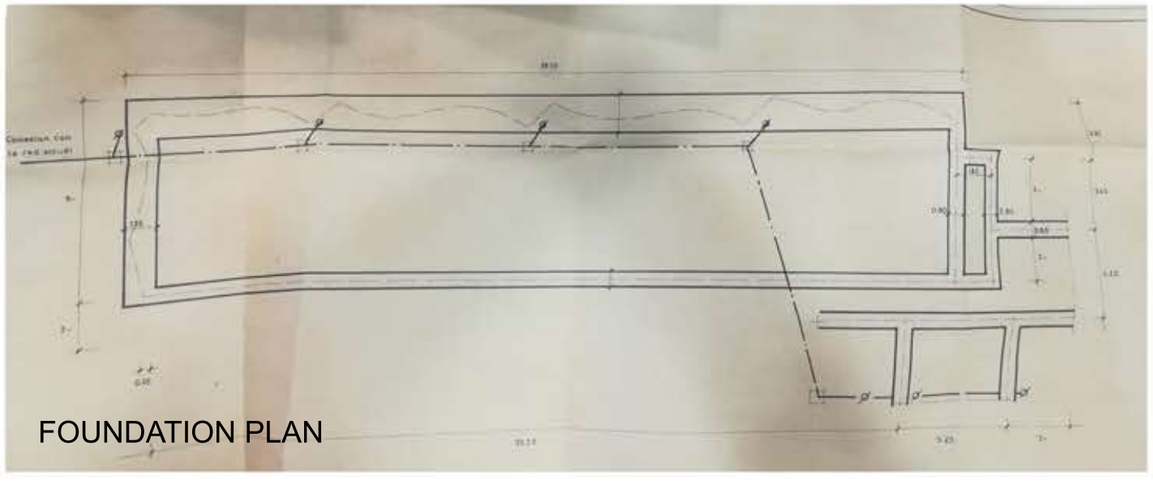
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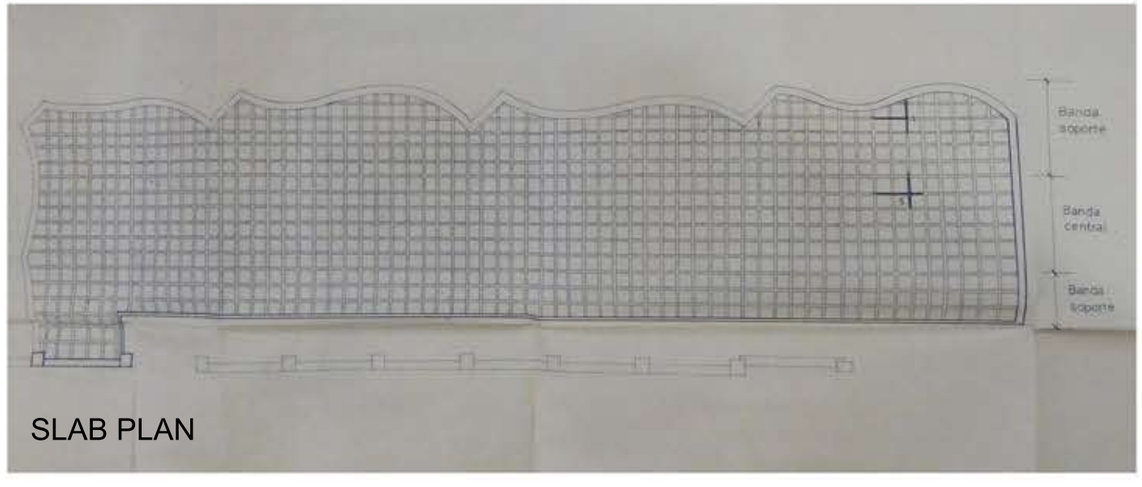

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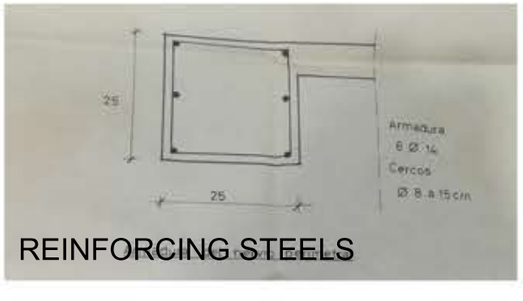

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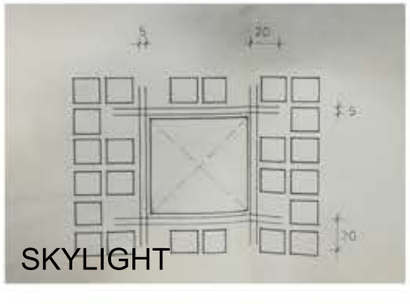


SKYLIGHT

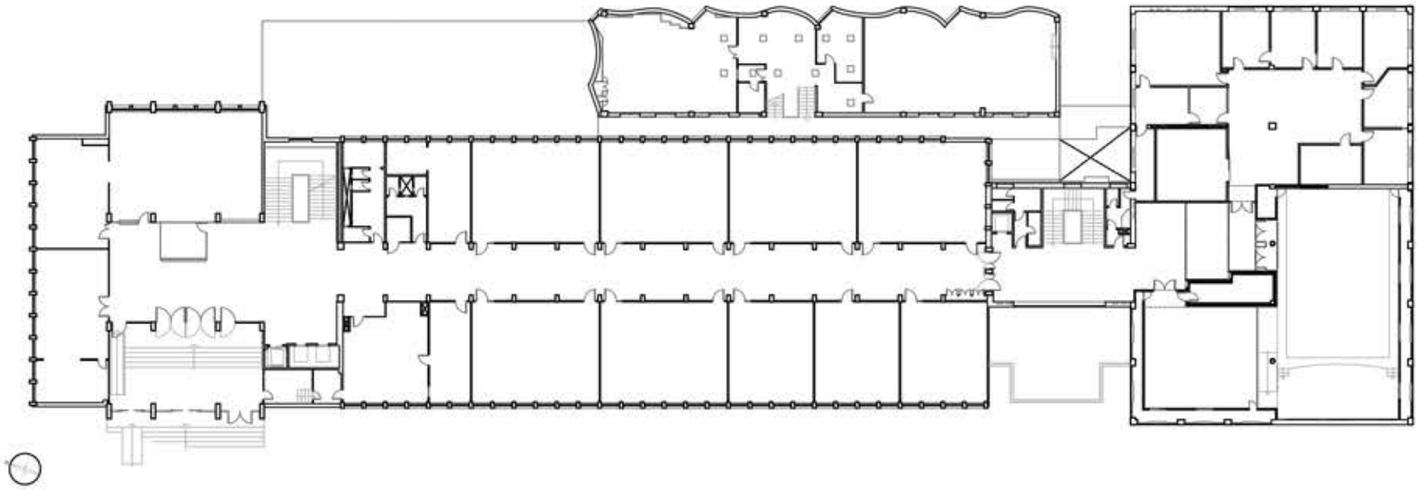
Pictures source: Arxiu de la Universitat Politècnica de Catalunya. Escola Politècnica Superior d'Edificació de Barcelona. ''Plànols de l'EPSEB (Arquitecte: Cèsar Gallofré Porrera)'', 1981

Escola Politècnica Superior d'Edificació de Barcelona UNIVERSITAT POLITÈCNICA DE CATALUNYA	REHABILITATION PROJECT OF THE EPSEB FACULTY BUILDING	SCALE:
STUDENT: Elisa Petrucci SUPERVISOR: Montserrat Bosch Gonzales	TITLE: Evolution of the building - Archive research	ANNEX: 1.5

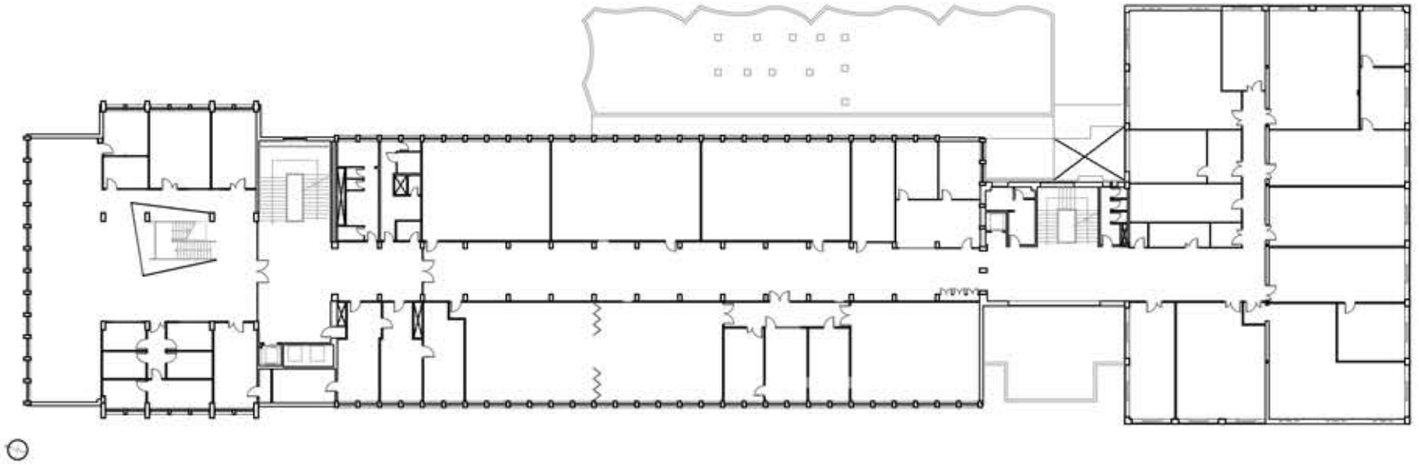
ANNEX 2

DRAWINGS

GROUND FLOOR

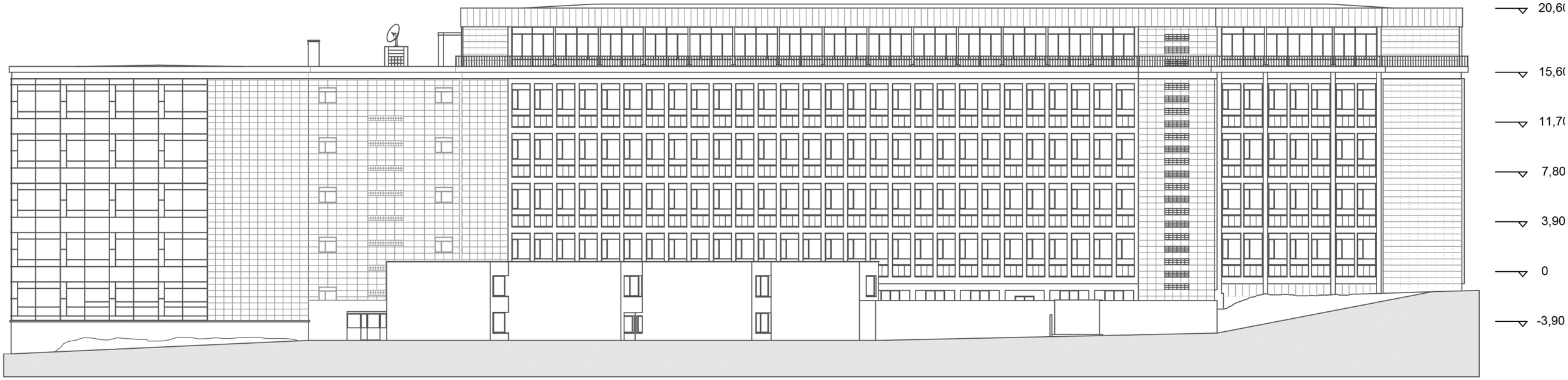


FIRST FLOOR

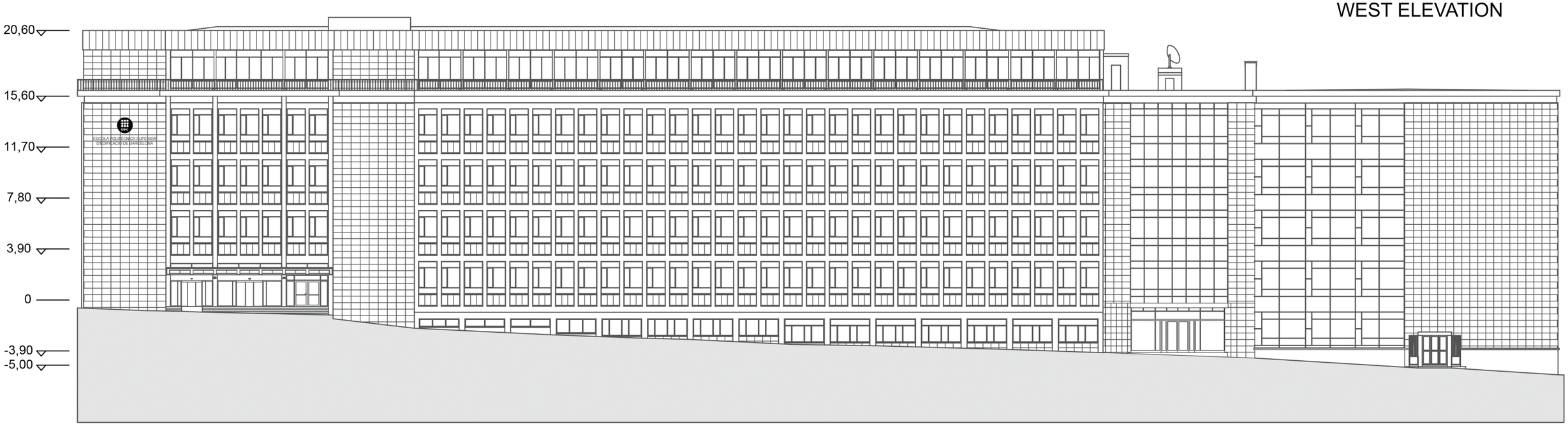


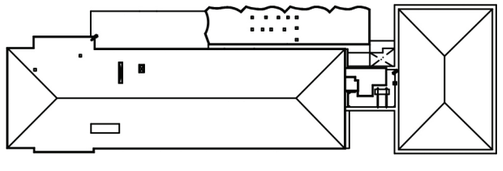
Escola Politècnica Superior d'Edificació de Barcelona UNIVERSITAT POLITÈCNICA DE CATALUNYA	REHABILITATION PROJECT OF THE EPSEB FACULTY BUILDING	SCALE: 1:500
STUDENT: Elisa Petrucci SUPERVISOR: Montserrat Bosch Gonzales	TITLE: Plans	ANNEX: 2.2

EAST ELEVATION



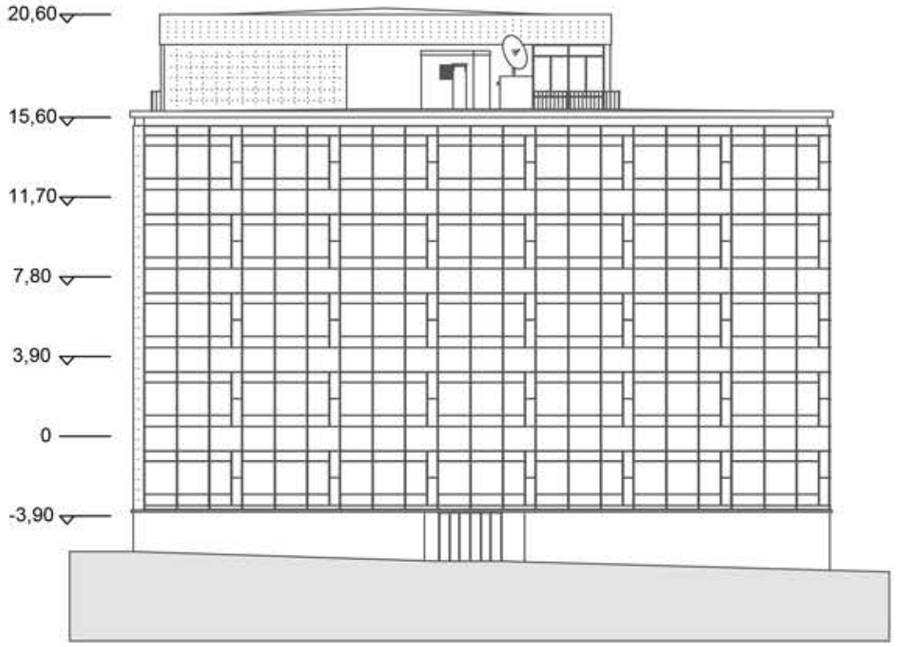
WEST ELEVATION



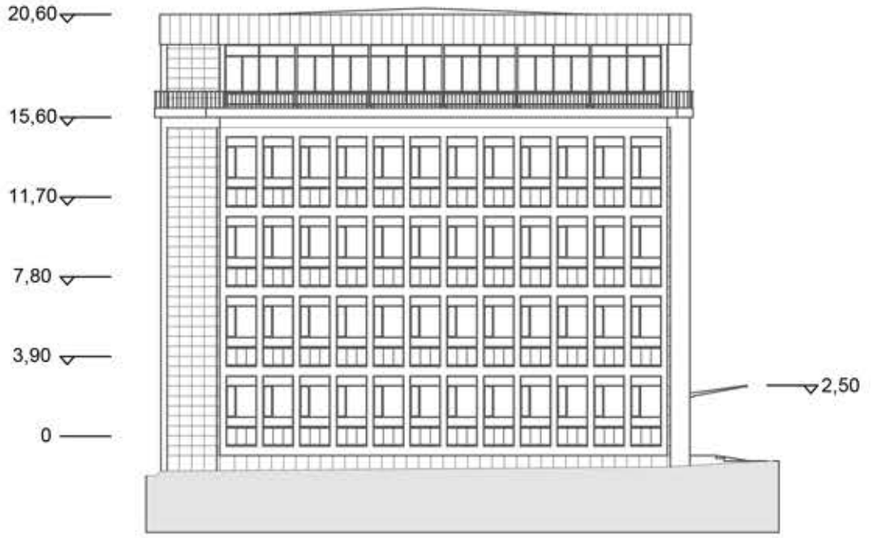


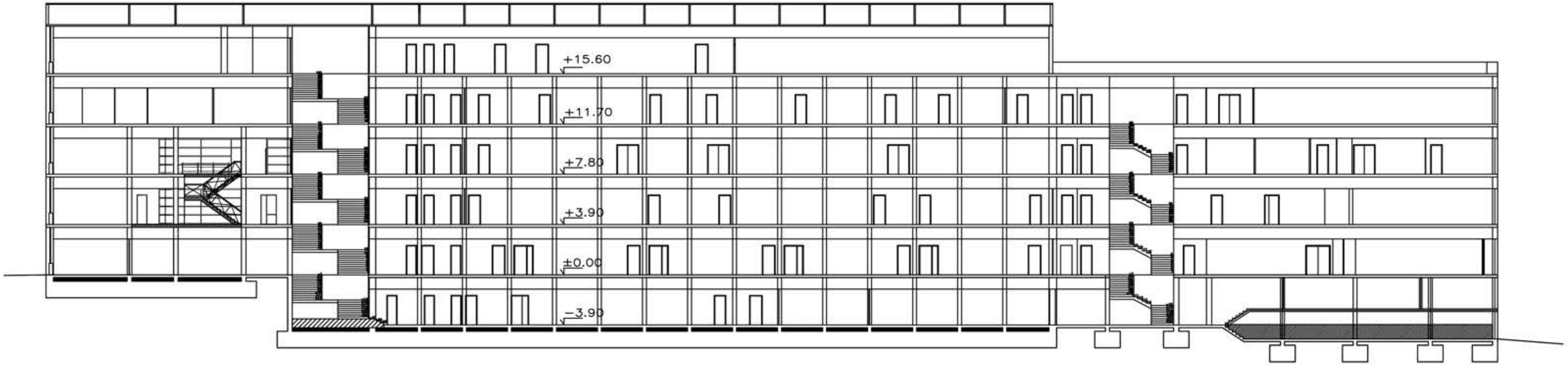
Escola Politècnica Superior d'Edificació de Barcelona UNIVERSITAT POLITÈCNICA DE CATALUNYA	REHABILITATION PROJECT OF THE EPSEB FACULTY BUILDING	SCALE: 1:300
STUDENT: Elisa Petrucci SUPERVISOR: Montserrat Bosch Gonzales	TITLE: Elevations	ANNEX: 2.5

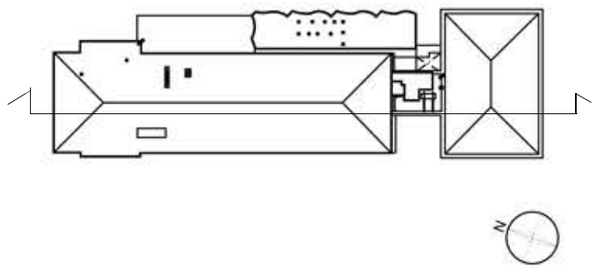
SOUTH ELEVATION



NORTH ELEVATION







Escola Politècnica Superior d'Edificació de Barcelona
UNIVERSITAT POLITÈCNICA DE CATALUNYA

REHABILITATION PROJECT OF THE EPSEB FACULTY BUILDING

SCALE: 1:300

STUDENT: Elisa Petrucci
SUPERVISOR: Montserrat Bosch Gonzales

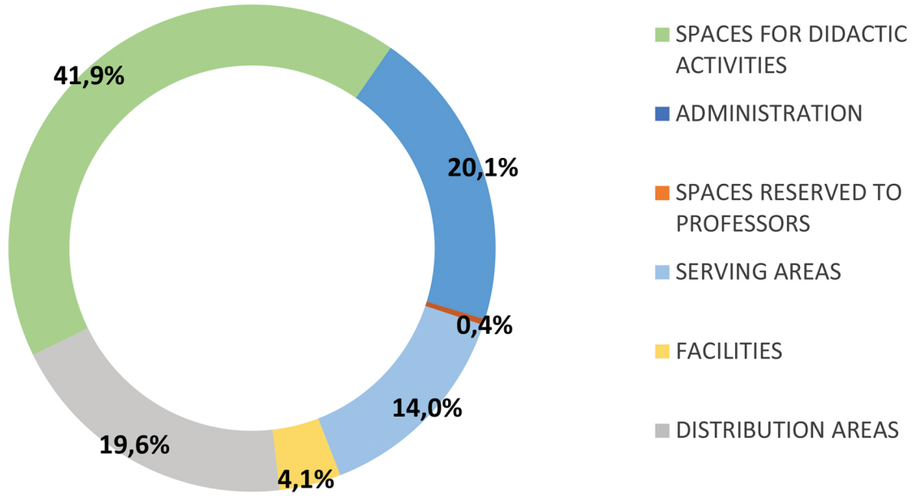
TITLE: Elevations and longitudinal section

ANNEX: 2.6

ANNEX 3

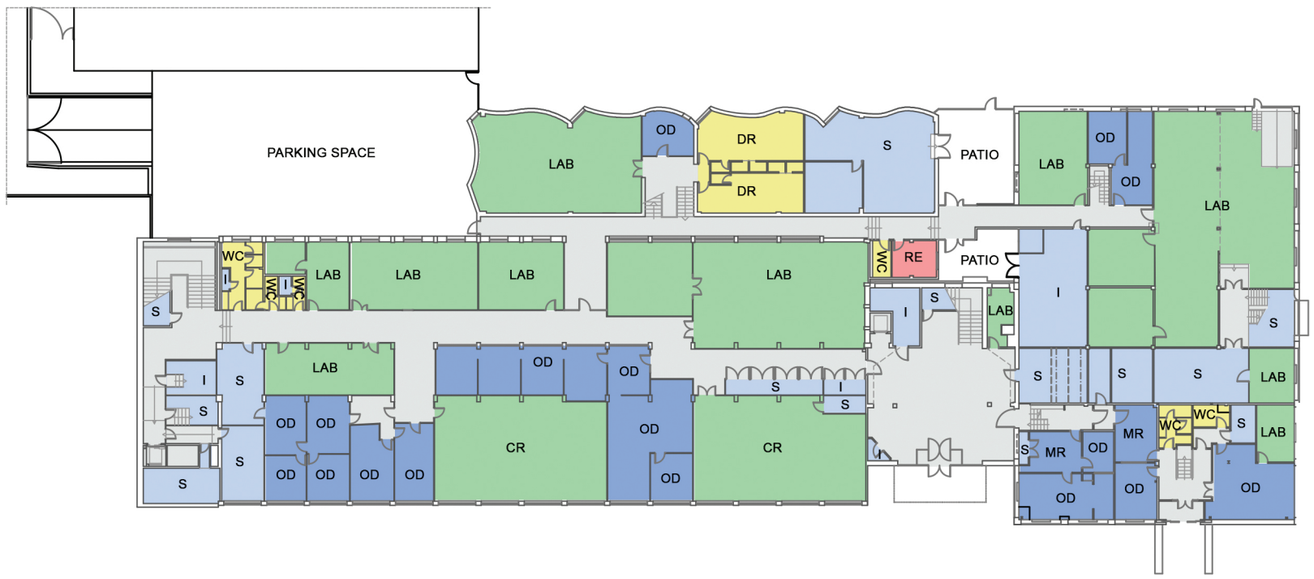
FUNCTIONAL ANALYSIS

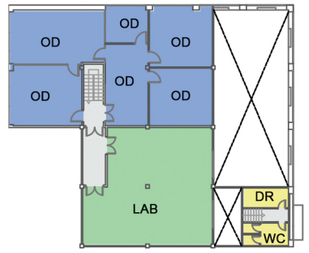
BASEMENT AND MEZZANINES



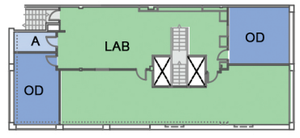
CALCULATION AND PERCENTAGE DIAGRAM OF SURFACES DIVIDED BY FUNCTION

	SPACES FOR DIDACTIC ACTIVITIES	Number	Surface (sm)	Total (sm)
CR	Classrooms	2	234,4	1236,1
LAB	Laboratories	13	1001,7	
	ADMINISTRATION	Number	Surface (sm)	Total (sm)
OD	Offices and departments	25	561	591,4
MR	Meeting rooms	2	30,4	
	SPACES RESERVED TO PROFESSORS	Number	Surface (sm)	Total (sm)
RE	Relaxing areas	1	10,8	10,8
	SERVING AREAS	Number	Surface (sm)	Total (sm)
A	Archives	1	5,5	412,4
S	Storage areas	15	323,1	
I	Installations	7	83,8	
	FACILITIES	Number	Surface (sm)	Total (sm)
WC	Bathrooms	7	49,2	120,7
DR	Dressing rooms	3	71,5	
	DISTRIBUTION AREAS	Number	Surface (sm)	Total (sm)
	Corridors and hallways	5	342,3	561,2
	Stairs	13	85,9	
	Lifts	2	5,8	
	Entrance halls	1	127,15	



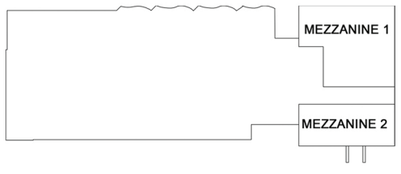


MEZZANINE 1



MEZZANINE 2

DISTRIBUTION AND CLASSIFICATION OF SURFACES BY USE



MEZZANINES LOCATION ON THE PLAN

Escola Politècnica Superior d'Edificació de Barcelona
UNIVERSITAT POLITÈCNICA DE CATALUNYA

REHABILITATION PROJECT OF THE EPSEB FACULTY BUILDING

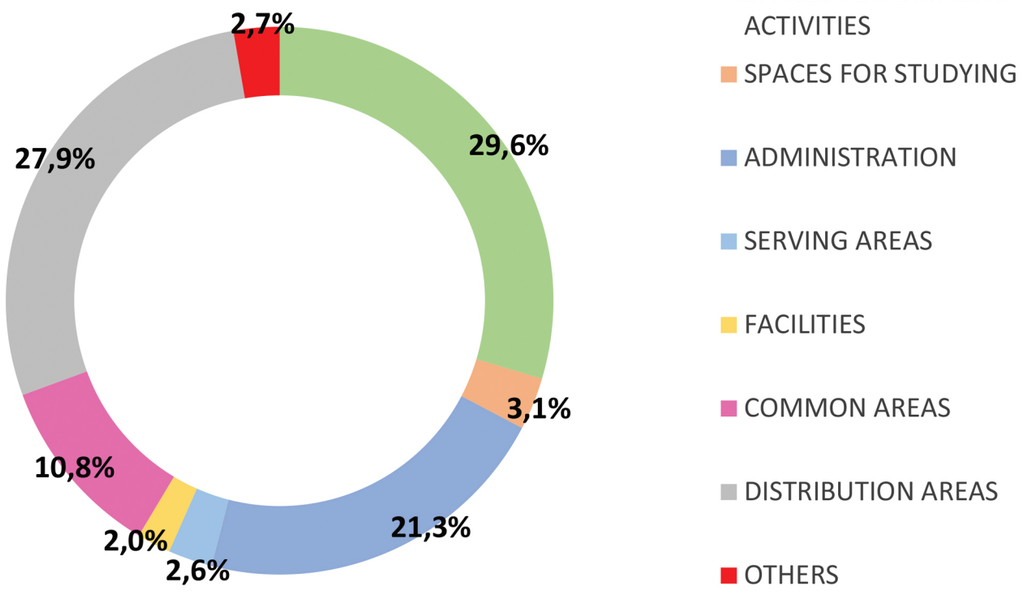
SCALE: 1:500

STUDENT: Elisa Petrucci
SUPERVISOR: Montserrat Bosch Gonzales

TITLE: Functional analysis - Basement

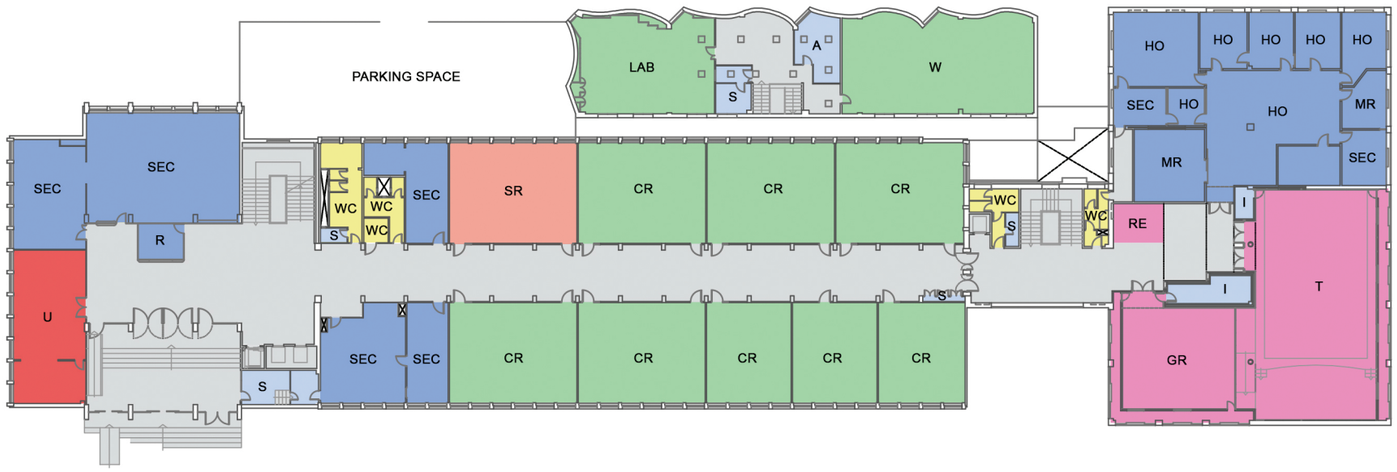
ANNEX: 3.1

GROUND FLOOR



CALCULATION AND PERCENTAGE DIAGRAM OF SURFACES DIVIDED BY FUNCTION

	SPACES FOR DIDACTIC ACTIVITIES	Number	Surface (sm)	Total (sm)
CR	Classrooms	8	598	
LAB	Laboratories	1	90,3	812,8
W	Workshop spaces	1	124,5	
	SPACES FOR STUDYING	Number	Surface (sm)	Total (sm)
SR	Studying rooms	1	85,3	85,3
	ADMINISTRATION	Number	Surface (sm)	Total (sm)
SEC	Secretary	5	300,2	
R	Reception	1	10,9	585,9
HO	Head offices	7	225,9	
MR	Meeting rooms	2	48,9	
	SERVING AREAS	Number	Surface (sm)	Total (sm)
A	Archives	1	17,8	
S	Storage areas	5	37	71,9
I	Installations	2	17,1	
	FACILITIES	Number	Surface (sm)	Total (sm)
WC	Bathrooms	5	55,3	55,3
	COMMON AREAS	Number	Surface (sm)	Total (sm)
RE	Relaxing areas	1	15	
GR	Graduation Room	1	79,5	296,4
T	Theatre	1	201,9	
	DISTRIBUTION AREAS	Number	Surface (sm)	Total (sm)
	Corridors and hallways	3	381,24	
	Stairs	6	103,38	767,1
	Lifts	4	12,7	
	Entrance halls	2	269,8	
	OTHERS	Number	Surface (sm)	Total (sm)
U	Unused spaces	1	73,73	73,7



DISTRIBUTION AND CLASSIFICATION OF SURFACES BY USE

Escola Politècnica Superior d'Edificació de Barcelona
UNIVERSITAT POLITÈCNICA DE CATALUNYA

REHABILITATION PROJECT OF THE EPSEB FACULTY BUILDING

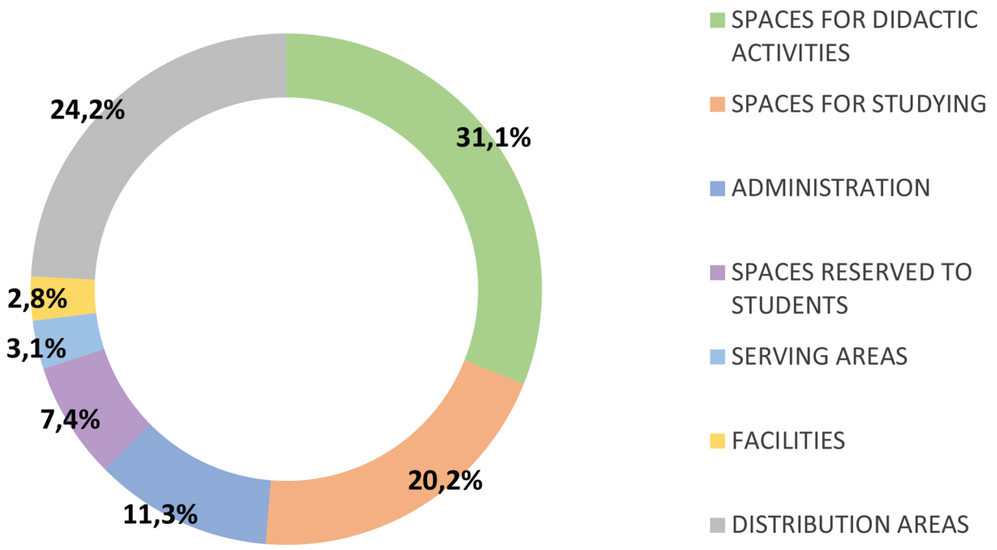
SCALE: 1:500

STUDENT: Elisa Petrucci
SUPERVISOR: Montserrat Bosch Gonzales

TITLE: Functional analysis - Ground floor

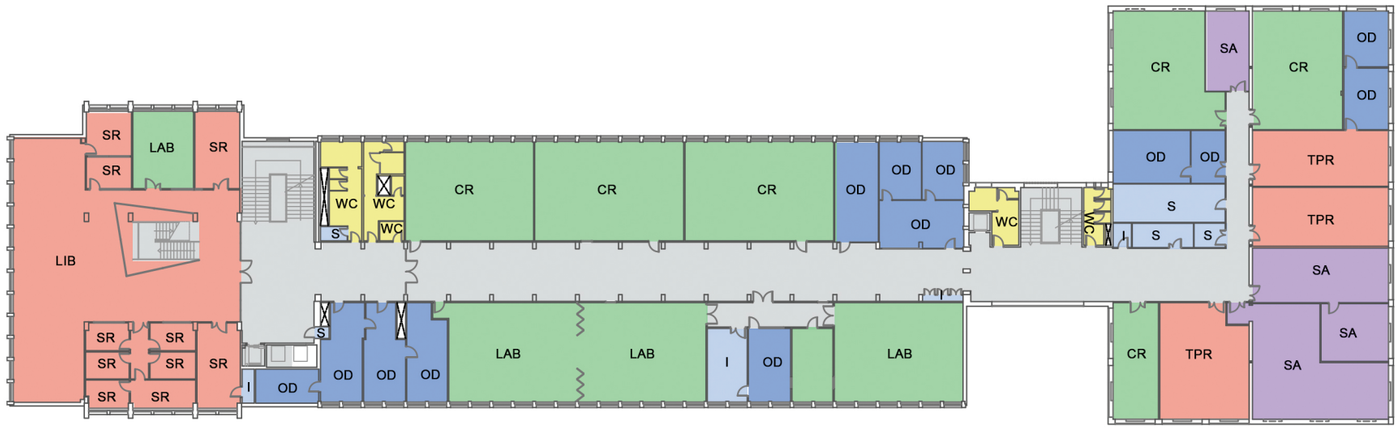
ANNEX: 3.2

FIRST FLOOR



CALCULATION AND PERCENTAGE DIAGRAM OF SURFACES DIVIDED BY FUNCTION

	SPACES FOR DIDACTIC ACTIVITIES	Number	Surface (sm)	Total (sm)
CR	Classrooms	6	465,3	752,9
LAB	Laboratories	4	287,6	
	SPACES FOR STUDYING	Number	Surface (sm)	Total (sm)
LIB	Library	1	246,2	
TPR	Thesis/Phd rooms	3	169,4	490,8
SR	Studying rooms	8	75,2	
	ADMINISTRATION	Number	Surface (sm)	Total (sm)
OD	Offices and departments	13	273,3	273,3
	SPACES RESERVED TO STUDENTS	Number	Surface (sm)	Total (sm)
SA	Student associations	4	179,4	179,4
	SERVING AREAS	Number	Surface (sm)	Total (sm)
S	Storage areas	5	47,2	74,2
I	Installations	3	27	
	FACILITIES	Number	Surface (sm)	Total (sm)
WC	Bathrooms	5	67,4	67,4
	DISTRIBUTION AREAS	Number	Surface (sm)	Total (sm)
	Corridors and hallways	3	504,1	
	Stairs	3	73,6	586,7
	Lifts	3	9	



DISTRIBUTION AND CLASSIFICATION OF SURFACES BY USE

Escola Politècnica Superior d'Edificació de Barcelona
UNIVERSITAT POLITÈCNICA DE CATALUNYA

REHABILITATION PROJECT OF THE EPSEB FACULTY BUILDING

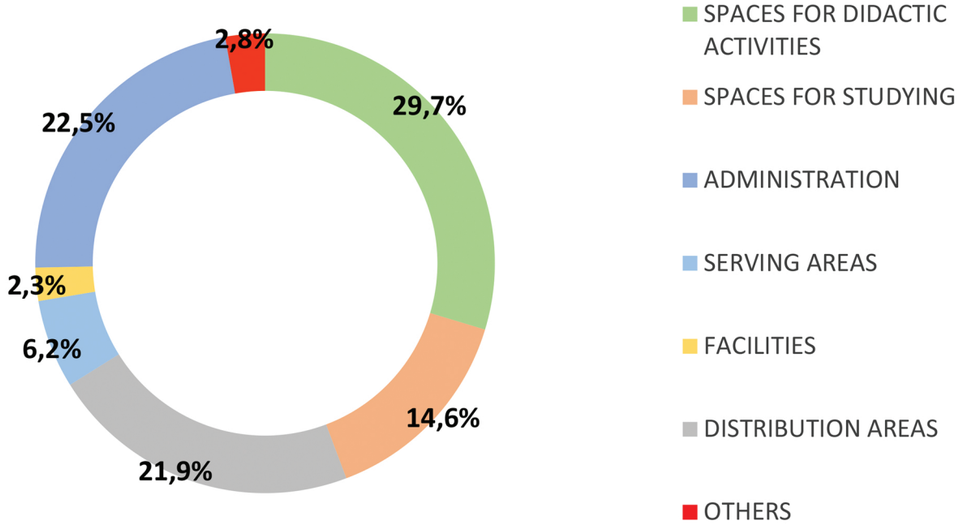
SCALE: 1:500

STUDENT: Elisa Petrucci
SUPERVISOR: Montserrat Bosch Gonzales

TITLE: Functional analysis - First floor

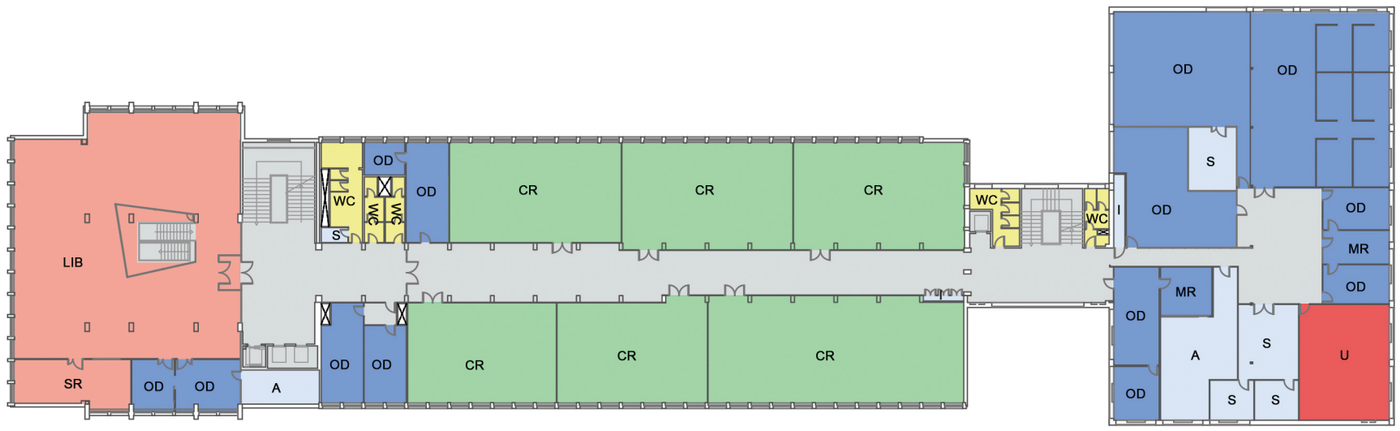
ANNEX: 3.3

SECOND FLOOR



CALCULATION AND PERCENTAGE DIAGRAM OF SURFACES DIVIDED BY FUNCTION

	SPACES FOR DIDACTIC ACTIVITIES	Number	Surface (sm)	Total (sm)
CR	Classrooms	6	738,4	738,4
	SPACES FOR STUDYING	Number	Surface (sm)	Total (sm)
LIB	Library	1	327,5	363,1
SR	Studying rooms	1	35,6	
	ADMINISTRATION	Number	Surface (sm)	Total (sm)
OD	Offices and departments	13	545	545
	SERVING AREAS	Number	Surface (sm)	Total (sm)
S	Storage areas	5	76,9	
A	Archives	2	71,3	155
I	Installations	2	6,8	
	FACILITIES	Number	Surface (sm)	Total (sm)
WC	Bathrooms	5	58,1	58,1
	DISTRIBUTION AREAS	Number	Surface (sm)	Total (sm)
	Corridors and hallways	5	474	
	Stairs	3	73,6	560,3
	Lifts	4	12,7	
	OTHERS	Number	Surface (sm)	Total (sm)
U	Unused spaces	1	69,36	69,4



DISTRIBUTION AND CLASSIFICATION OF SURFACES BY USE

Escola Politècnica Superior d'Edificació de Barcelona
UNIVERSITAT POLITÈCNICA DE CATALUNYA

REHABILITATION PROJECT OF THE EPSEB FACULTY BUILDING

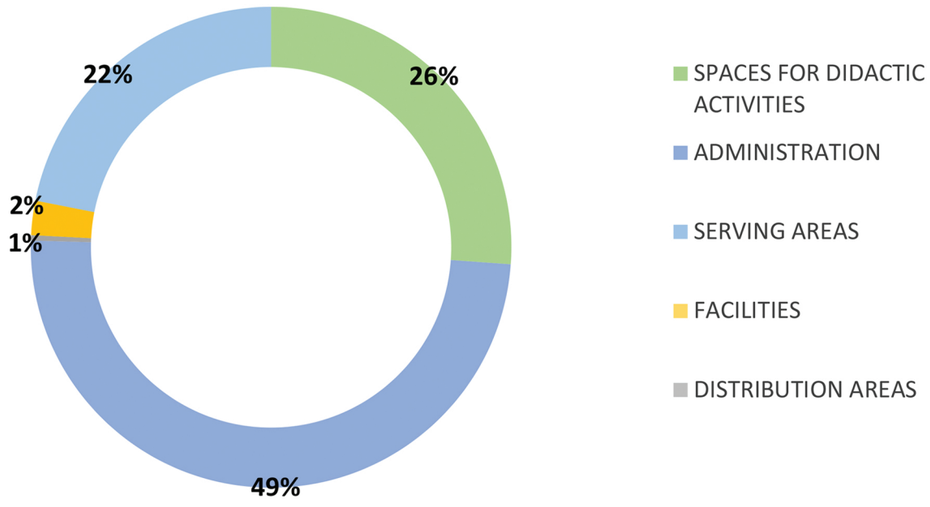
SCALE: 1:500

STUDENT: Elisa Petrucci
SUPERVISOR: Montserrat Bosch Gonzales

TITLE: Functional analysis - Second floor

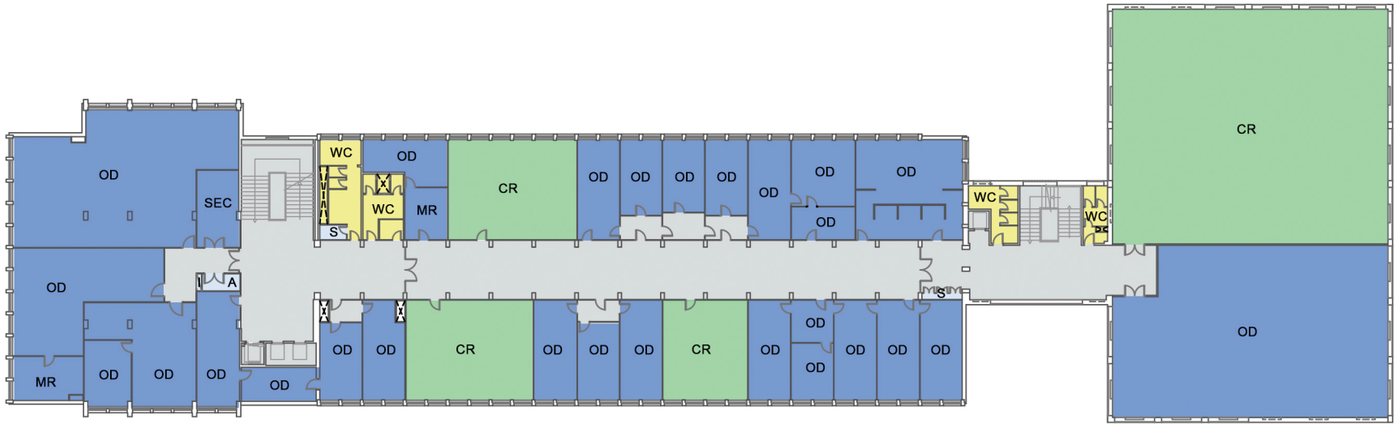
ANNEX: 3.4

THIRD FLOOR



CALCULATION AND PERCENTAGE DIAGRAM OF SURFACES DIVIDED BY FUNCTION

	SPACES FOR DIDACTIC ACTIVITIES	Number	Surface (sm)	Total (sm)
CR	Classrooms	4	656,8	656,8
	ADMINISTRATION	Number	Surface (sm)	Total (sm)
OD	Offices and departments	27	1182,9	
MR	Meeting rooms	2	35,2	1239,9
SEC	Secretary	1	21,8	
	SERVING AREAS	Number	Surface (sm)	Total (sm)
S	Storage areas	2	4,33	
A	Archives	1	4,33	9,26
I	Installations	1	0,6	
	FACILITIES	Number	Surface (sm)	Total (sm)
WC	Bathrooms	5	58,1	58,1
	DISTRIBUTION AREAS	Number	Surface (sm)	Total (sm)
	Corridors and hallways	7	479,2	
	Stairs	2	58	549,9
	Lifts	4	12,7	



DISTRIBUTION AND CLASSIFICATION OF SURFACES BY USE

Escola Politècnica Superior d'Edificació de Barcelona
UNIVERSITAT POLITÈCNICA DE CATALUNYA

REHABILITATION PROJECT OF THE EPSEB FACULTY BUILDING

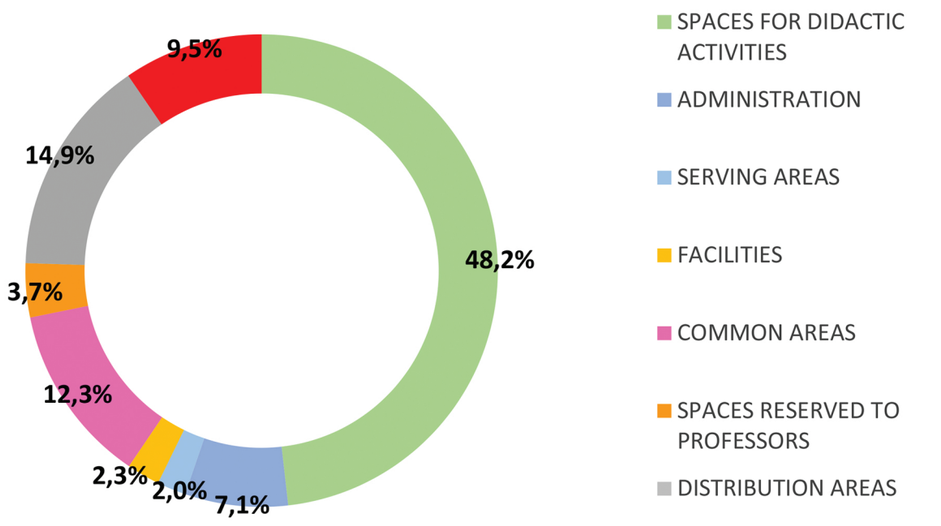
SCALE: 1:500

STUDENT: Elisa Petrucci
SUPERVISOR: Montserrat Bosch Gonzales

TITLE: Functional analysis - Third floor

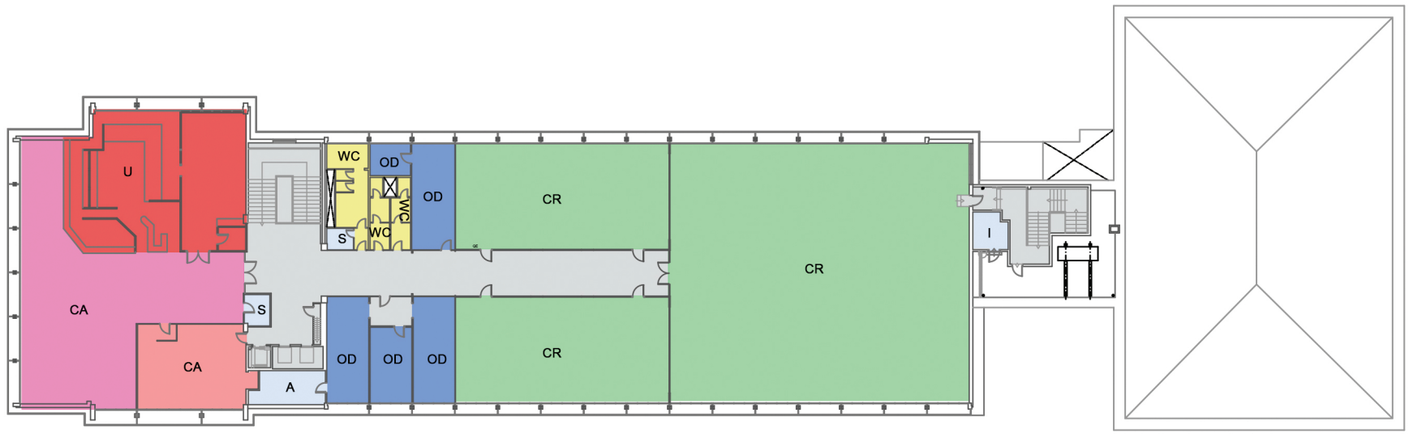
ANNEX: 3.5

FOURTH FLOOR



CALCULATION AND PERCENTAGE DIAGRAM OF SURFACES DIVIDED BY FUNCTION

	SPACES FOR DIDACTIC ACTIVITIES	Number	Surface (sm)	Total (sm)
CR	Classrooms	3	816,5	816,5
	ADMINISTRATION	Number	Surface (sm)	Total (sm)
OD	Offices and departments	5	119,5	119,5
	SERVING AREAS	Number	Surface (sm)	Total (sm)
S	Storage areas	2	9,13	
A	Archives	1	16	33,4
I	Installations	1	8,3	
	FACILITIES	Number	Surface (sm)	Total (sm)
WC	Bathrooms	3	38,35	38,4
	COMMON AREAS	Number	Surface (sm)	Total (sm)
CA	Canteen	1	208,8	208,8
	SPACES RESERVED TO PROFESSORS	Number	Surface (sm)	Total (sm)
CA	Canteen	1	62,6	62,6
	DISTRIBUTION AREAS	Number	Surface (sm)	Total (sm)
	Corridors and hallways	2	166,8	
	Stairs	4	76,15	253,2
	Lifts	3	10,2	
	OTHERS	Number	Surface (sm)	Total (sm)
U	Unused spaces	1	161,7	161,7



DISTRIBUTION AND CLASSIFICATION OF SURFACES BY USE

Escola Politècnica Superior d'Edificació de Barcelona
UNIVERSITAT POLITÈCNICA DE CATALUNYA

REHABILITATION PROJECT OF THE EPSEB FACULTY BUILDING

SCALE: 1:500

STUDENT: Elisa Petrucci
SUPERVISOR: Montserrat Bosch Gonzales

TITLE: Functional analysis - Fourth floor

ANNEX: 3.6